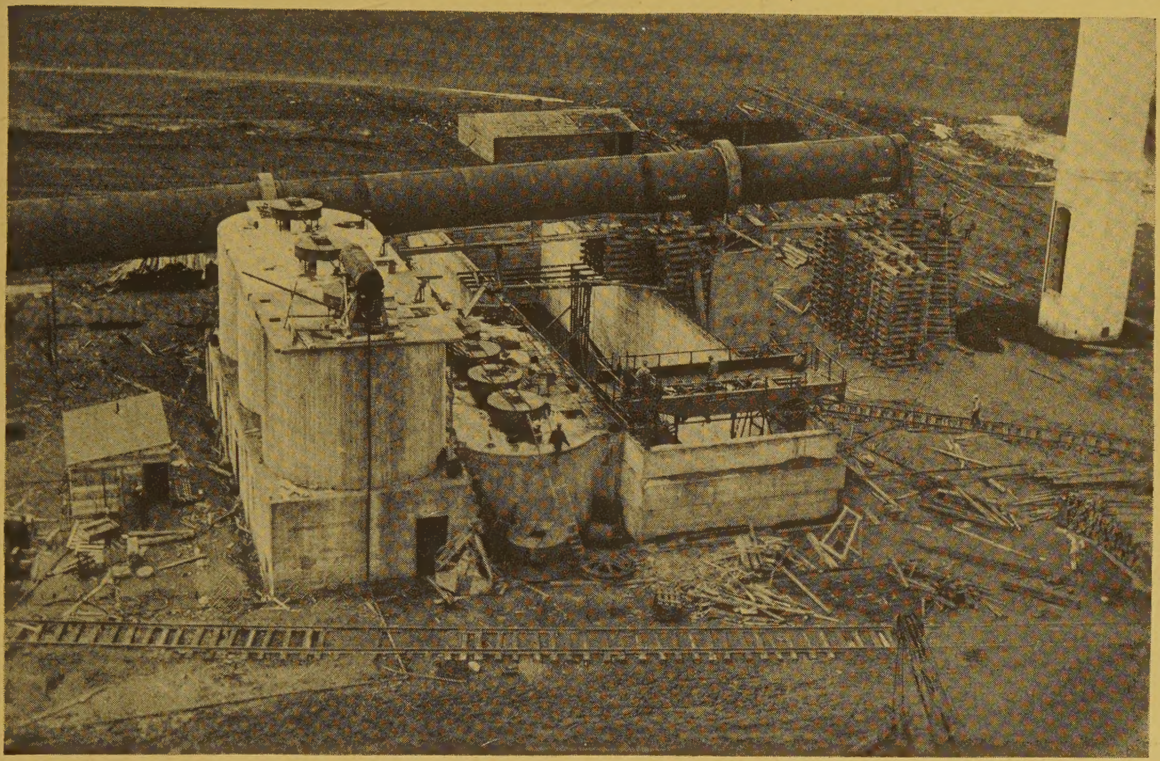
MILL SECTION of
Concrete

AGITATORS
FOR CEMENT SLURRY



The illustration shows a typical installation of a SMIDTH agitating system for a one or two kiln wet process cement plant.

From the grinding machinery the slurry is delivered to the three-unit correcting basin. Each unit of the basin has a capacity of 600 barrels finished weight.

From the correcting basin, the material is tapped in the correct proportion and flows by gravity to the quadruple mix basin which holds about 2000 barrels. In this basin it should have the correct composition.

By means of a patented arrangement, the slurry passes, by bottom to top overflow, from the mix basin to the storage basin, which, in this case, is equipped with a traveling agitator. The basin illustrated holds slurry for 7500 barrels of cement.

The basins may be made of various sizes and placed differently in relation to each other than shown to suit the general arrangement of the plant.

The slurry is agitated mechanically and by means of air blown through nozzles located on the lower agitating arms.

Thorough mixing, complete chemical control, low horsepower consumption, low maintenance costs and large storage capacity, combined with utility of space are the advantages of the SMIDTH system.

F. L. Smidth & Co.
(Incorporated 1895)
ENGINEERS
Designers and Equippers of
Cement Making Factories
225 Broadway NEW YORK, N. Y.
Factory, Foundry and Laboratory—Elizabeth, N. J.

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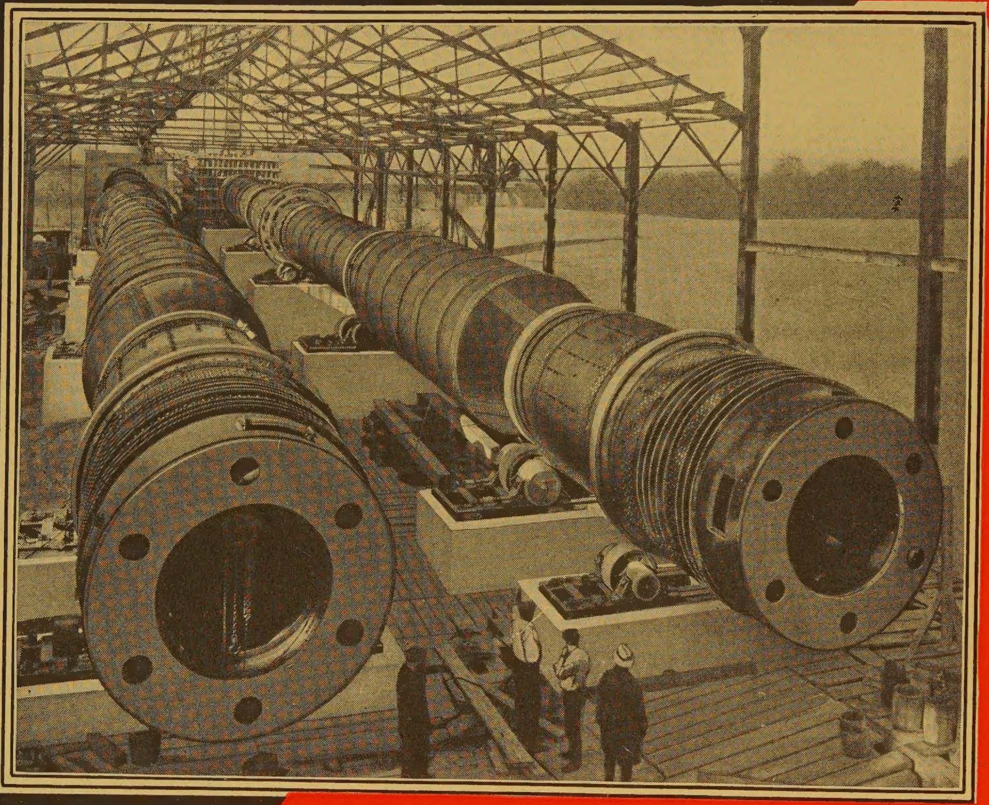
POLYSIUS
SOLO KILNS



INSTALLED IN NEW PLANT
OF THE KEYSTONE PORTLAND CEMENT CO., BATH, PA.

POLYSIUS CORPORATION

BETHLEHEM TRUST BLDG.
BETHLEHEM, PA.

MILL SECTION of

Concrete

The Cement Mill Edition of Concrete is edited exclusively for those interested in the manufacture of cement. Its pages are devoted to discussions of plant design, management, operation, production efficiency, chemical research and control, quarry operation, progress and news of the industry.

The Cement Mill Edition also contains all the material published in the corresponding Regular Edition and so provides news of the uses and merchandising of the materials whose manufacture is discussed in the Mill Edition. The Regular Section furnishes mill operating officials and mill executives valuable points of contact with the users of the materials they produce.

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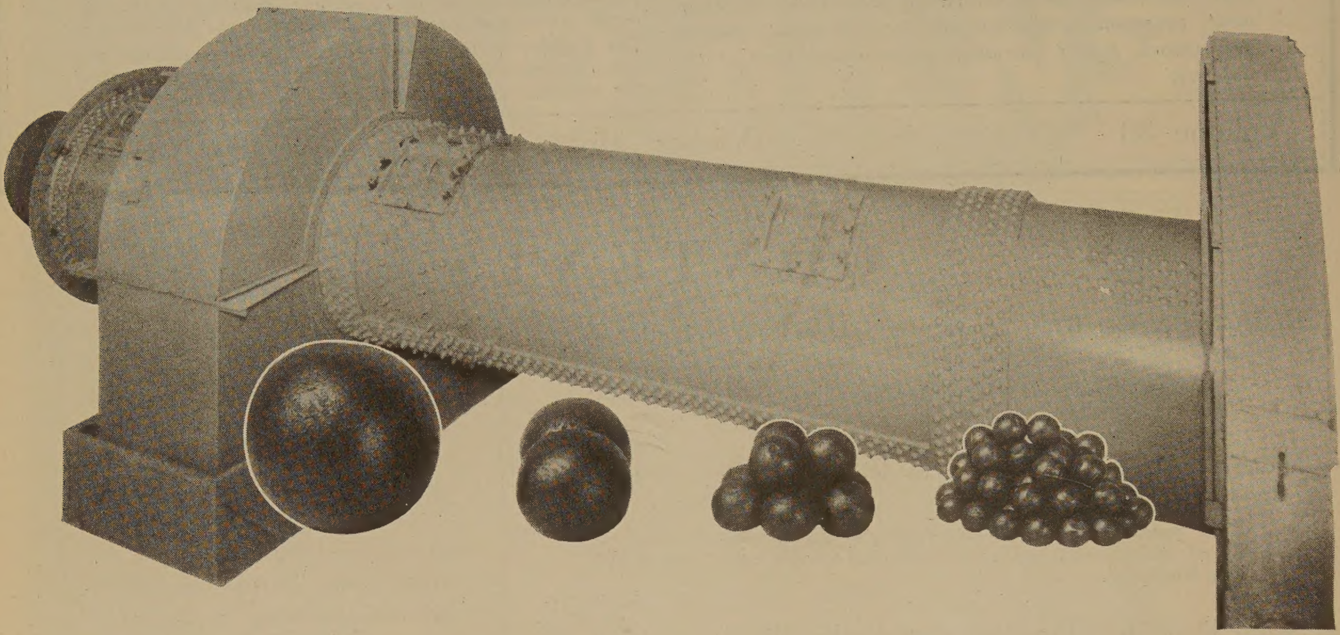
COATES GRINDING MEDIA



are designed to meet the requirements of cement mills

We don't just sell grinding media to cement mills. We make them for cement mills, and to meet the exacting requirements of cement mill practice.

When you buy Coates' balls or slugs for cement mill use you know that you are getting the maximum in grinding efficiency for the price paid.

We are prepared to furnish all sizes of grinding balls and slugs, as follows:

CARBEX FORGED STEEL BALLS—⅞ in., 1 in., 1¼ in., 1½ in., 2½ in., 3 in., 3½ in., 4 in., 4½ in., 5 in. diameter.

"TUNGSCO" Steel Nuggets—⅝x1 in.; ¾x1¼ in.; ⅞x1¼ in.; 1x1¼ in.; 1⅛x1¼ in.; 1¼x1⅜ in.

If you will let us know what your grinding requirements are, we shall be glad to submit prices on same. We carry ample stocks and can make prompt shipments.

Coates Steel Products Company
GREENVILLE, ILLINOIS

Largest Manufacturer of Grinding Media Exclusively

MILL SECTION of

Concrete

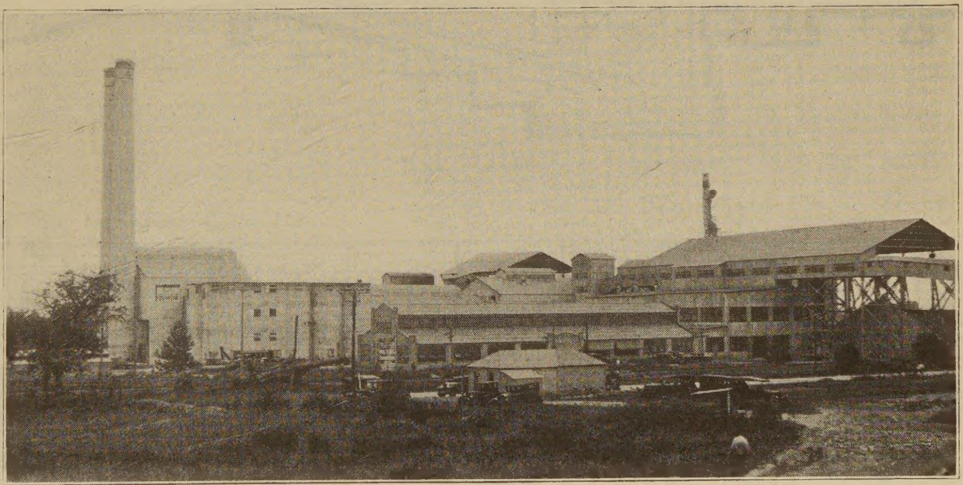
Vol. 33 Chicago, October, 1928 No. 4

Keystone Plant at Bath, Pennsylvania, Goes Into Operation

Detailed Description of First Completely Equipped Polysius Cement Plant in the United States—Plant Layout—Equipment Description—Solo Kilns with Special Slurry Drying Device—Scrubber for Waste Heat Gases from Coal Dryer—Capacity of Plant to Be Doubled Immediately

MUCH interest has been displayed among American cement plant engineers and operators in regard to the use of Polysius equipment for cement manufacture. In the new plant of the Keystone Portland Cement Company near Bath, Pennsylvania, Polysius equipment was used almost exclusively and a description of this plant provides a fairly complete picture of a Polysius-designed and equipped cement plant.

Though the first kiln of the new Keystone plant went into operation July 15th, plans have already been made and equipment orders placed for doubling the present 1,000,000 barrel per year capacity of the plant. Recent experiments on concrete pavement construction demonstrated that the cement produced is of the high early strength type.



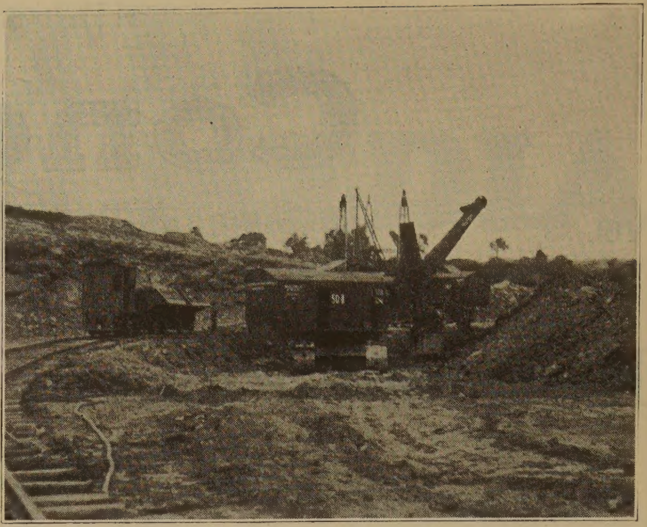
General view of the new plant of the Keystone Portland Cement Company at Bath, Pa.

Raw Materials

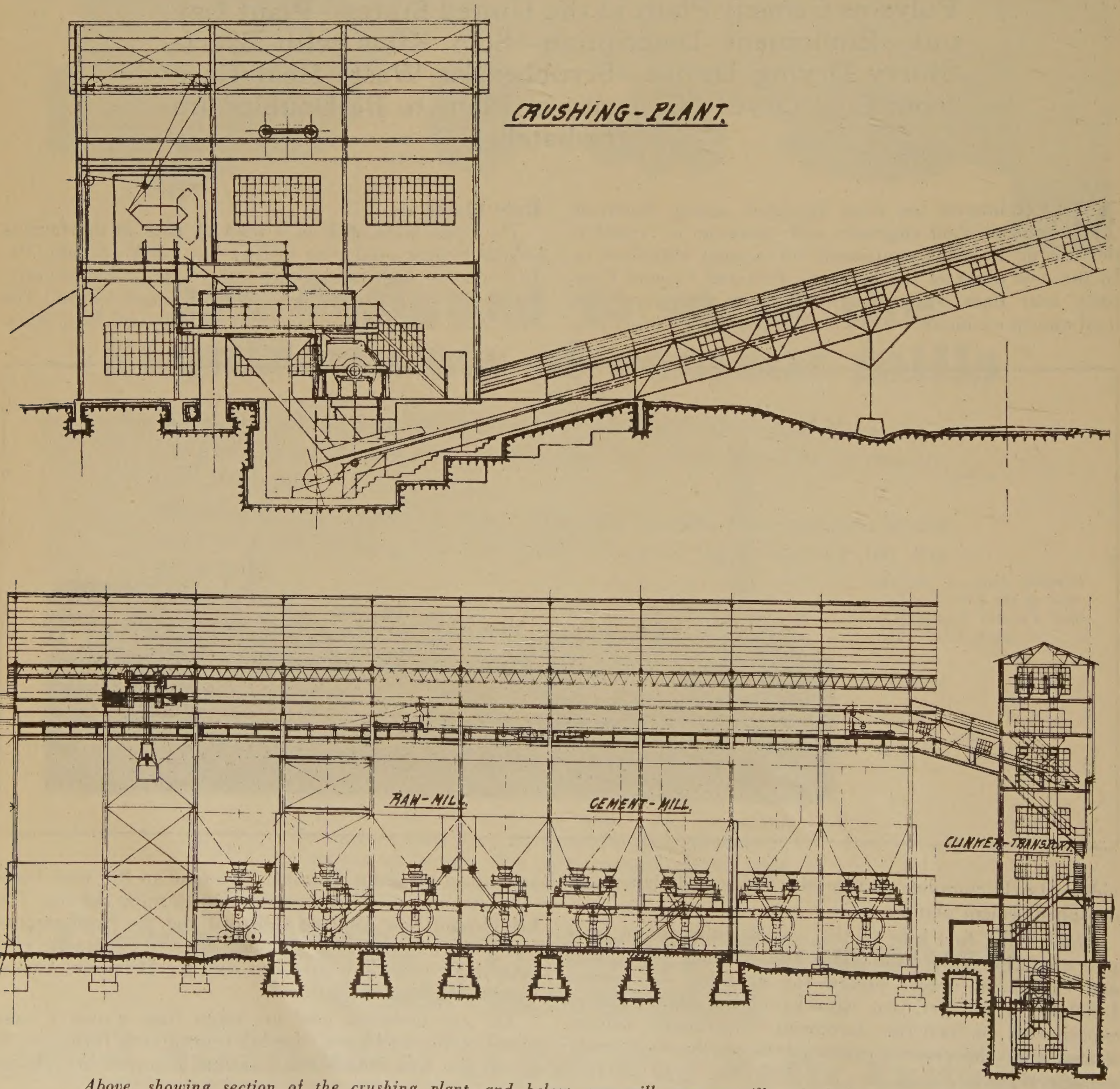
The plant is located on a tract of land in the famous Lehigh cement producing district just north of Bath, Pa. Two concrete highways, one on either side of the property, are available for truck deliveries and finished cement. The road to the east of the plant leads directly into Bethlehem, a distance of about 7 miles. The road to the west leads to Northampton. Allentown is about 10 miles distant. The Lehigh and New England Railroad and the Northampton and Bath Railroad serve the plant directly. There are also switching connections provided with the Delaware, Lackawanna and Western Railroad.

The raw materials used are taken from a quarry composed of the well-known Lehigh cement rock formation in which the lime and silica contents required are almost perfectly proportioned by nature. The quarry is located immediately west of the Bath-Northampton Road and a standard gauge railroad leads to the crusher house which is also west of the road. The quarry face is from 80 to 100 ft. or more in height and the floor of the quarry is about 30 ft. above the floor level of the plant. The drilling is accomplished by four well drills, putting down 6-in. holes 12 ft. apart. The holes are usually drilled to a depth of 8 to 12 ft. below the quarry floor. Drilled holes are loaded first with a 75 per cent blasting gelatin over which a 60 per cent blasting gelatin charge is placed, the remainder of the hole being tamped with clay. When twelve or more of these holes are exploded at one time they bring down rock enough to operate the plant for several weeks.

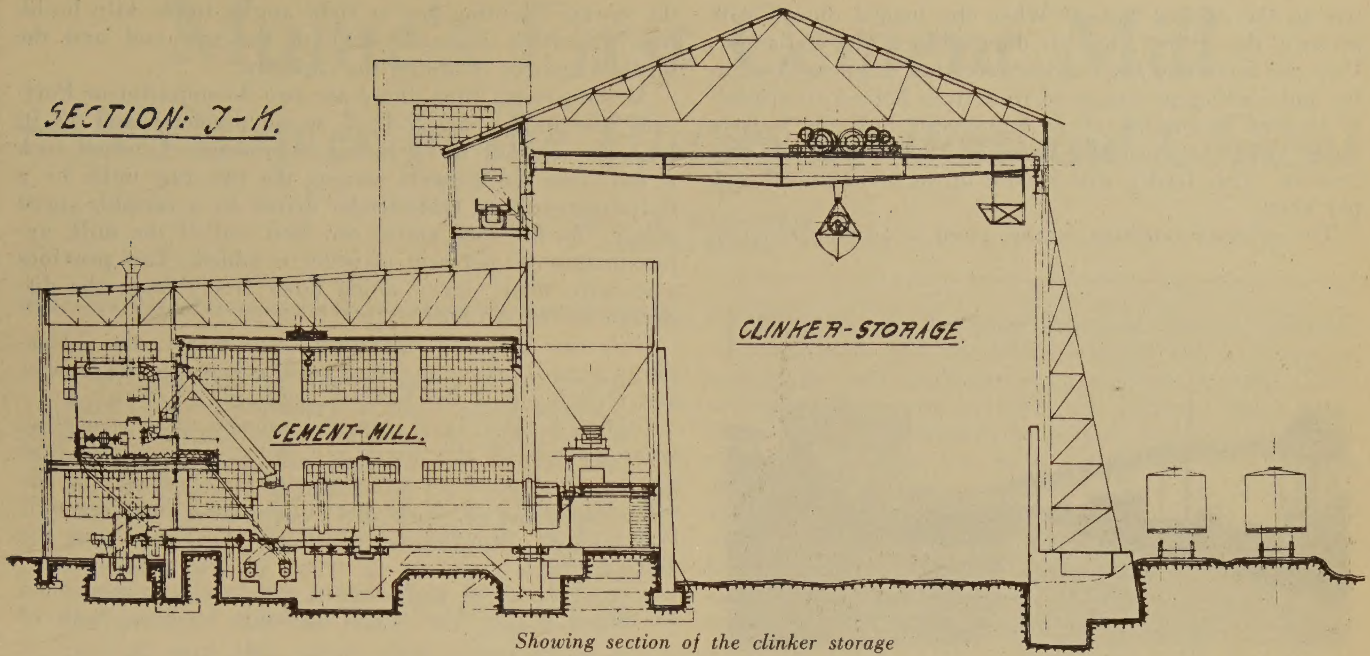
Two caterpillar Bucyrus-Erie electric shovels equipped with 2-yd. dippers load the rock into Easton Car and Construction Company side-dump steel cars of 10-ton capacity. A train of rock consisting of 10 cars is hauled over the standard gauge track by means of a gasoline locomo-



The quarry



Above, showing section of the crushing plant, and below, raw mill, cement mill and clinker transport sections



Showing section of the clinker storage

MOTOR LIST—General Electric Motors

CRUSHER

Item No. 2—Driving Grizzly: 1—15 H.P. Motor, 1200/600 R.P.M., 440 volts.

Item No. 3—Large Zet Crusher: 1—350 H.P. Motor, 180 R.P.M., 2300 volts.

Item No. 4—Belt Conveyor from Main Crusher to Rock Storage: 1—40 H.P. Motor, 900 R.P.M., 440 volts.

LIMESTONE

Item No. 5—Pan Conveyor Feeder to Zet Crusher: 1—10 H.P. Motor, 900 R.P.M., 440 volts.

Item No. 6—Limestone Zet Crusher: 1—100 H.P. Motor, 240 R.P.M., 2300 volts.

Item No. 7—Elevator from Limestone Zet Crusher: 1—15 H.P. 900 R.P.M., 440 volts.

Item No. 9.—Belt conveyor for Gypsum: 1—7½ H.P. 900 R.P.M., 440 volts.

WET GRINDING

Item No. 10—Mill Table Feeds: 2—5 H.P. 600/1150 R.P.M., 230 volts D.C.

Item No. 11—Double Screw for feeding Dust: 2—2 H.P. 600/1150 R.P.M., 230 volts D.C.

Item No. 12—Raw material Solo Mills: 2—700 H.P. 144 R.P.M., 2300 volts.

KILNS—

Item No. 14—Kiln Drives: 2—60 H.P. 360/720 R.P.M., 230 volts D.C.

Item No. 15—Coal Dust Fans for Kilns: 2—60 H.P. 900 R.P.M., 440 volts.

Item No. 16—Double Screws for Coal Dust for Kilns: 2—4 H.P. 600/1150 R.P.M., 230 volts D.C.

CLINKER HANDLING

Item No. 17—Pan Conveyor under Kilns: 1—10 H.P. 900 R.P.M., 440 volts.

Item No. 18—Clinker Roll Crusher: 1—40 900 R.P.M., 440 volts.

Item No. 19—Pan Conveyor from Roll Crusher to Elevator: 1—15 H.P. 900 R.P.M., 440 volts.

Item No. 20—Clinker Elevator: 1—15 H.P. 900 R.P.M., 440 volts.

Item No. 21—Clinker Belt Conveyor over Bins: 1—10 H.P. 900 R.P.M., 440 volts.

CLINKER MILL

Item No. 22—Table Feeders for Clinker and Gypsum: 2—7½ H.P. 600/1130 R.P.M., 230 volts D.C.

Item No. 23—Clinker Solo Mills: 2—700 H.P. 144 R.P.M., 2300 volts.

Item No. 24—Cement Screw Conveyor from Solo Mills to Kinyon Pumps: 1—20 H.P. 900 R.P.M., 440 volts.

CEMENT STORAGE

Item No. 25—Tunnel Conveyors and Cross Conveyors: 2—40 H.P. 900 R.P.M., 440 volts.

Item No. 26—Top Conveyor and Screen over Packing Bins: 2—15 H.P. 900 R.P.M., 440 volts.

Item No. 27—Bates Packing Machines: 4—20 H.P. 1200 R.P.M., 440 volts.

Item No. 28—Clean Up Screw Conveyor in Basement: 1—7½ H.P. 900 R.P.M., 440 volts.

Item No. 29—Bag Wheel Drive: 1—25 H.P. 900 R.P.M., 440 volts.

Item No. 30—Bag Belts: 2—3 H.P. 900 R.P.M., 440 volts.

Item No. 31—Sorting Belt: 1—3 H.P. 900 R.P.M., 440 volts.

Item No. 31a—Dust Collecting channel: 1—2 H.P. 900 R.P.M., 440 volts.

Item No. 32—Cement Elevator: 2—15 R.P.M., 440 volts.

COAL PLANT

Item No. 33—Track Hopper Feeder: 1—7½ H.P. 900 R.P.M., 440 volts.

Item No. 34—Tunnel Belt Conveyor: 1—15 H.P. 900 R.P.M., 440 volts.

Item No. 35—Raw Coal Elevator: 1—15 H.P. 900 R.P.M., 440 volts.

Item No. 36—Dryer Table Feeder: 1—5 H.P. 900 R.P.M., 440 volts.

Item No. 37—Coal Dryer: 1—15 H.P. 720/360 R.P.M., 440 volts.

Item No. 38—Coal Dryer Stoker: 1—3 H.P. 300/600 R.P.M., 230 volts D.C.

Item No. 39—Solo Mill Dust Collector Fan: 1—20 H.P. 720 R.P.M., 440 volts.

Item No. 41—Elevator from Dryer to Solo Mill Bin: 1—7½ H.P. 900 R.P.M., 440 volts.

Item No. 42—Coal Weighing Machines: 1—2 H.P. 1800 R.P.M., 440 volts.

Item No. 43—Solo Mill Table Feeder: 1—5 H.P. 900 R.P.M., 440 volts.

Item No. 44—Coal Solo Mill: 1—350 H.P. 144 R.P.M., 2300 volts.

Item No. 45—Air Filter: 1—20 H.P. 720 R.P.M., 440 volts.

Item No. 46—Clinker Air Filter: 2—25 H.P. 600 R.P.M., 440 volts.

Item No. 47—Cement Filters—2 for Bates Machines and one for Bag wheel: 3—20 720 R.P.M., 440 volts.

Item Nos. 48, 49—Conveyors for Kiln Dust Collecting System: 3—7½ H. P. 900 R.P.M., 440 volts.

KINYON PUMPS

Item No. 52—Coal Pumps: 2—20 H.P. 900 R.P.M., 440 volts.

Item No. 53—Cement Pumps: 2—75 H.P. 900 R.P.M., 440 volts.

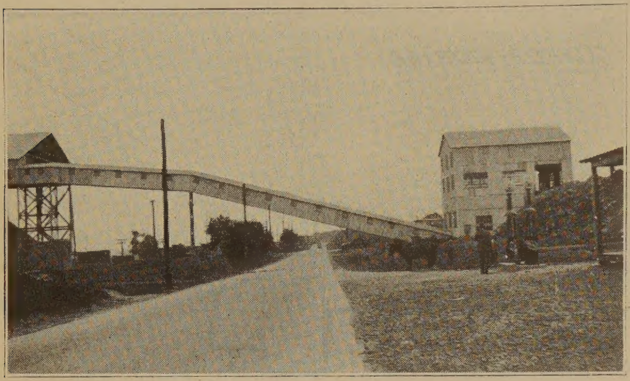
Item No. 54—Dust Pump: 1—10 H.P. 900 R.P.M., 440 volts.

Item No. 65—Table feeder: 1—2 H.P. 900 R.P.M., 440 volts.

Item No. 66—1—3 H.P. 900 R.P.M., 440 volts.

tive to the crusher house. When the loaded quarry cars arrive at the crusher, they are dumped by a Flory (Bangor, Pa.) car hoist into the crusher receiving hopper. A regular and continuous stream of rock from hopper to crusher is secured by means of an automatic Polysius Grizzly feeder which is installed between the hopper and the crusher. This feeder will handle up to 300 tons of rock per hour.

The primary crushing at this point is accomplished in a Solo type crusher, which will handle in one operation any rock that will pass the Grizzly feeder. This means that rock in sizes up to 40 by 30 by 25 inches will be crushed to the size of a butternut in a single operation. The one crusher required discharges onto a 36-in. Polysius inclined belt conveyor which takes the rock over the highway either to storage or direct to the raw mill feed bins.



The belt conveyor takes the crushed rock from the crusher house to the right across the highway and places it in the storage building

A covered storage building, 80 ft. wide by 500 ft. long, has been provided. The section of this building nearest the crusher is reserved for storing crushed rock. The next section contains the clinker and the far end coal. In the clinker section there is also a smaller compartment for the storage of gypsum.

A 15-ton Shepard traveling crane equipped with a 2-yd. grab bucket operates over the entire length of the storage building. It reclaims all the various materials from the storage and places them into their respective feed bins.

Grinding Department

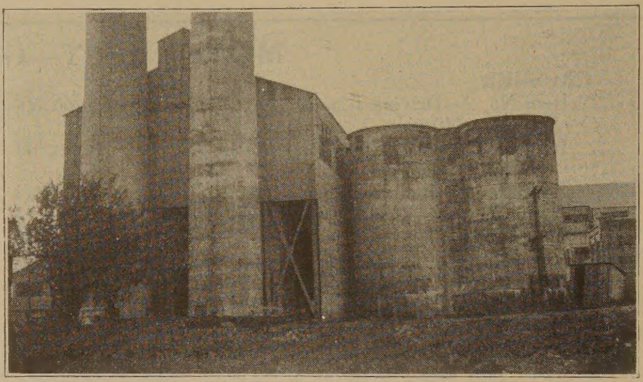
The grinding department building is located parallel to the storage building and at right angles to the kiln building. Provision is made at both the raw end and the finished end for doubling the capacity.

At the present time, there are two 3-compartment Polysius Solo mills, each 7 ft. 3 in. in diameter and 43 ft. long for each of the grinding operations. Crushed rock is fed from the hoppers serving the two raw mills by a Polysius revolving table feeder driven by a variable speed motor. As the rock enters the feed end of the mill, approximately 36 per cent of water is added. This provides a smooth, thick slurry which flows freely from the discharge end of the mill.

Only one grinding operation is necessary, the 3-compartment mill taking any sized rock as it leaves the crusher and reducing it to the fineness required.

Clinker is taken from storage by means of the traveling crane previously described and delivered into the bins serving the two finish grinding mills. These are of the same type and size as the raw mills. Each finishing mill is served by two bins, one supplying clinker and the other gypsum.

The clinker and gypsum are accurately proportioned by means of Polysius revolving table feeders. Both of the finish mill feeders are driven by one variable speed motor.

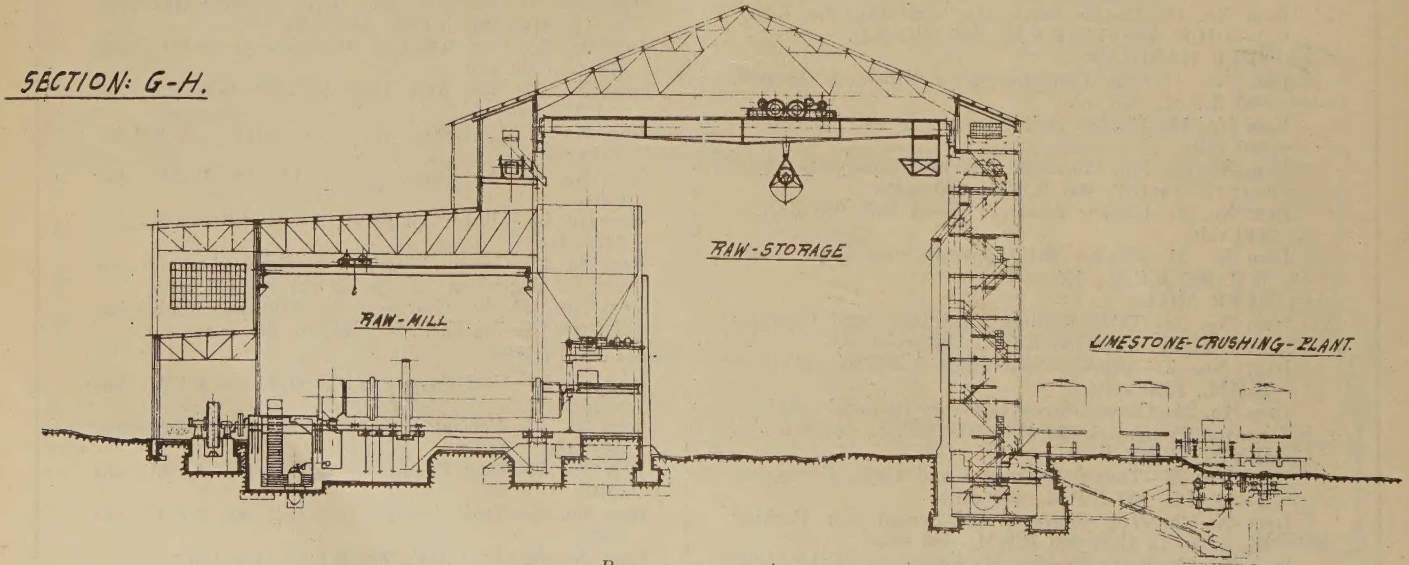


The slurry blending tanks and the kiln stacks

Slurry Handling

The slurry discharge from the raw mills is delivered to a long basin which serves two Polysius Pressors. Two vertical cylindrical chambers with a slurry inlet and

(Continued on page 102)



Raw storage section

Maine's First Cement Mill
—A Chapter in the History of Portland Cement

By C. H. SONNTAG
Consulting Engineer

On page 67 of the "History of the Portland Cement Industry in the United States," written by Robert W. Lesley in co-operation with John B. Lober and George T. Bartlett, will be found the following paragraph:

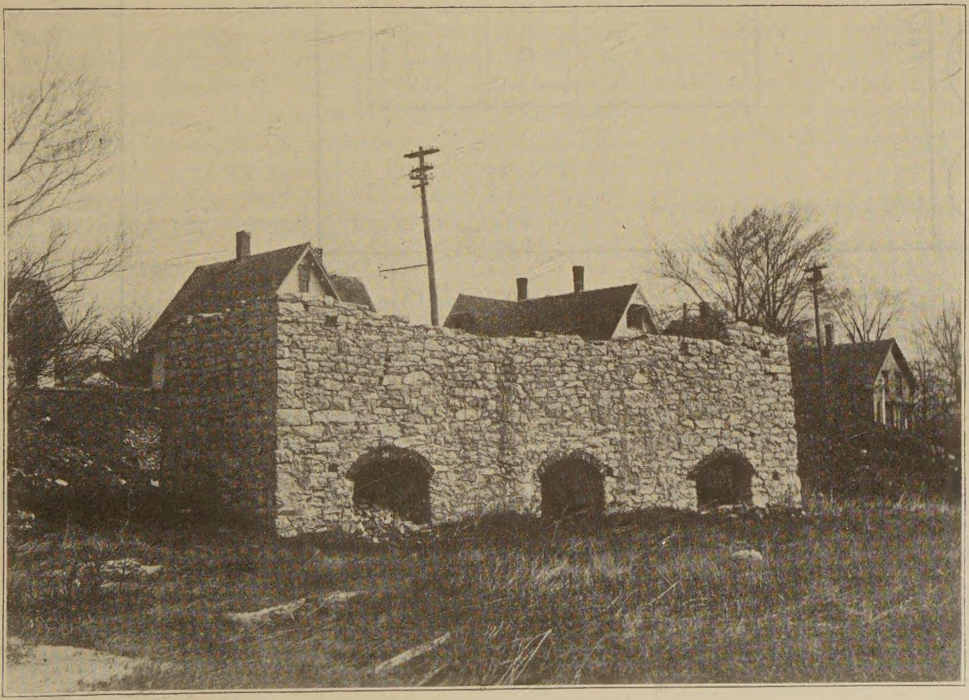
"The Cobb Lime Company, an important producer of lime at Rockland, Maine, started work in 1879 to produce portland cement, but owing to the high price of fuel, the product was too costly for commercial success and this plant shut down after a short period of manufacture."

That is the only reference previously published concerning this interesting episode in the early history of portland cement in New England. Now C. H. Sonntag, who was consulting engineer for the construction of the new Lawrence cement plant at Thomaston, Maine, (described in the April, 1928, issue of "Concrete") makes available the results of his investigations regarding the history and manufacturing methods used in this early mill. His findings are published in the following unique "cement plant description."

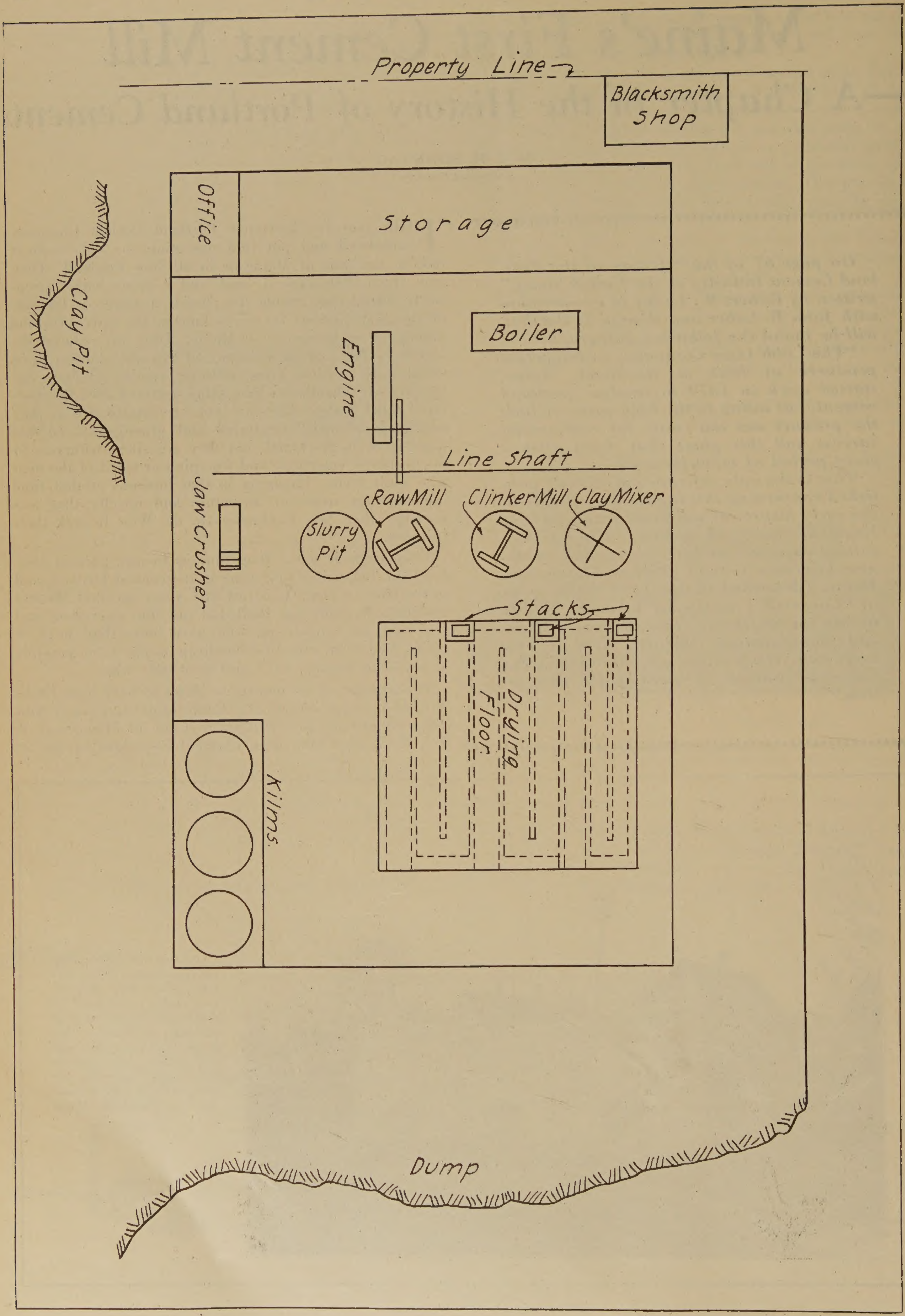
THIS year the Lawrence Portland Cement Company completed and put into operation the only cement mill in the state of Maine or in all New England. They own about 900 acres of land, and it seems rather peculiarly fitting that among the parcels acquired is the site of the first, and so far as is known, the only previous attempt to make cement in Maine. Time has reduced the visible evidence of the existence of this old plant to three small stone vertical kilns, differing not at all from the hundreds of abandoned lime kilns scattered over the eastern United States. They are not very impressive as they stand, abandoned, dismantled and grass-grown on the water-front in Rockland, but they are silent witnesses to the initiative, enterprise and true pioneer spirit of the men who built them. Engaging in that business at that time indicated the urge for adventure and novelty that was sending other New Englanders to the West to seek their fortunes.

Fifty years is not a long time as history goes in New England, but it is a long time in the cement business and in the lives of men. It is just fifty years ago that Maine's first cement plant was built and put into operation, and few men are now living who were more than boys in 1878. But even with this handicap it has been possible to get some details of the mill as it once was.

The founder of the enterprise seems to have been Francis Cobb, organizer of the Cobb Lime Company, and father of ex-Governor William T. Cobb of Maine and of Col. C. W. S. Cobb, dean of the lime-makers in the St.



Only venerable New Englanders remember the days when these three old vertical kilns were used in making the first cement in the state of Maine. They were built 50 years ago and while then considerably larger than they are now, the kilns are a landmark at Rockland, Maine



Layout plan of Maine's first cement plant

Louis district, who recently passed away.

It is not recalled how or where he got the idea that cement could be made from Rockland materials, but in 1878 he engaged a man named Shaw to come over from England to design and build the plant. Those who remember him say that he was an impressive sort of man, possessing much dignity of manner, even for a day when that sort of thing was part of the professional stock-in-trade. He evidently knew cement-making as carried on in England at that time, and so the plant and process that he installed followed English practice closely.

Oxen Haul Stone to Plant

The raw materials were limestone and clay. The stone was the small and rejected material from the quarries supplying lime rock for burning, and was hauled to the plant by oxen. A jaw crusher in the mill gave the first reduction. Clay was dug from a pit across the street. It was felt that fresh water should be used, and it was obtained from a drilled well about 160 ft. deep, which gave an ample supply.

The clay was mechanically mixed with water to form a thin mud or slip, just as is done in some modern wet process mills, but on a smaller scale. Then the crushed stone and the clay suspension were put into a machine now known as a chaser mill, edge runner or wet pan. It consisted of a heavy cast-iron pan about 6 ft. in diameter, the bottom being about 2 in. thick. This bottom formed a circular path on which rolled two heavy cast-iron wheels about 4 ft. in diameter and 1 ft. thick. The stone and clay were reduced to a fine-grained paste by the peculiar rolling and rubbing action between the rollers and pan.

The paste was spread out in a layer from 4 to 6 in. thick on a large iron floor under which a fire-brick flue ran back and forth, a furnace being at one end. The paste was thus dried into irregular masses, and these were charged into the kilns with alternate layers of coke. The first coke came from England, a full cargo being brought over by the sailing vessel *Martha Cobb*.

The calcined lumps were broken up and ground in another edge runner mill, but to insure the proper fineness the material was elevated to the second floor and passed through a revolving screen, the coarse residue being returned for further grinding. The cement dropped into a barrel, which was set on a platform that was mechanically given a severe jolt once in a while to settle the contents, and this jolting seems to have been the cause of considerable wonder to the small boys of the neighborhood. The kilns were considerably larger than they are now, as each had a conical chimney about 20 ft. high, built of fire-brick and covered with common brick.

An Old-Fashioned Power Plant

The power plant had an interesting history, as it was old-fashioned even for that date. It consisted of a tubular boiler and an old-style long stroke single cylinder engine, with a wheel about 10 ft. in diameter. This wheel was a gear that meshed with another gear on the lineshaft from which the various machines were belted. It seems that in the early days of the lumbering industry in Maine, when merchantable timber was growing close to the rivers, it was customary to mount saw-mill machinery on a barge, and to pull this barge up on shore wherever sawing was to be done. This old boiler and engine were originally on such a barge, and were removed from it to drive the cement mill machinery.

There seems to be no very clear recollection of how long the mill was operated, estimates varying from a few months to two years. It was unsuccessful financially for the same reason that is now being combatted by eastern cement makers—it could not compete with cement made in Europe under old-world conditions and brought here as ballast, or at least with a very nominal freight charge. Its situation was the more unfortunate, since it depended very largely on water transportation for its product. Rockland at that time was the home port of an extensive fleet of vessels engaged in both coast-wise and foreign trade, but they delivered to just the same markets as those to which foreign cement had the easiest and cheapest access.

The quality of the product appears to have been excellent, and a few examples of work done with it are still in existence. The basement of Flint's market in Rockland is said to have been cemented with it, and a small dam on the road from Thomaston to Friendship is built of boulders laid up in this cement. It is known that the cement was regularly tested, as the company had a machine for determining the tensile strength just as it is done today, and long after the plant was shut down, the briquettes that were left over were used as playthings by the children of near-by homes. The writer has seen a paper-weight about 6 by $3\frac{1}{2}$ by $1\frac{1}{4}$ in., made when the mill was in operation, and bearing on one side the words "Portland Cement" and on the other "Cobb Lime Co." which is in good condition after fifty years of continuous use.

Showing the top af a 12-ft. sawmill dam at Thomaston, constructed 50 years ago with the cement then manufactured

Some of the Old Clinker Tested

The clinker from the kilns had to be sorted by hand, just as it did in the other old vertical kiln plants, and in a mill that was more or less experimental, as this one was, a certain amount of finished cement had to be thrown away. The old mill dump is still there, though eaten into by waves and tides. It is made up of alternate layers of cement and clinker. The cement looks about as might be expected considering that it was probably thrown out dry and allowed to harden in the weather. The clinker varies in quality from melted slag containing fragments of coke to pieces that look like fairly good clinker. There are many pieces that resemble black glass, but they are completely crystallized. These crystals, which are about 3/16-in. long, were not caused by weathering through the lapse of years, but seem to have formed on cooling from igneous fusion during the operation of the kilns, as fractured surfaces are perfectly fresh. They would probably be of interest to students of the lime-silica-alumina-iron oxide series of compounds.

Laboratory Tests

Some of the better-looking clinker, which had been exposed to the action of rain and ocean tides for fifty years, was ground into cement in the laboratory of the Lawrence Portland Cement Company and made into pats. There was much variation in the quality of the cement made from the individual lumps, which were ground separately. No gypsum was used. A few samples would not set at all, and resembled ground black glass. A number of them heated noticeably on mixing with water, and took their initial set in times ranging from twenty minutes to three hours. They passed the boiling test perfectly as to volume constancy, though they were quite weak, but on lying in the air for a week after boiling they have acquired a hardness and snap that compare well with newly-made cement. It is surprising that this should be so, considering the exposure that the clinker has undergone. No analyses or tensile strength tests were made.

Source of Historical Data

Much of the information now made available was kindly and gladly given by C. Wilkes Babb, president of the Knox Woolen Mills, Camden, Maine; Willis Knowlton, until recently operating the Knowlton Foundry and Machine Shop in Camden, and Captain Willis Snow of Rockland. Mr. Shaw, the English expert, had the edge-runners and probably some of the other machines built according to his designs by the Knowlton shop, and the patterns were in existence until a few years ago, when they were accidentally burned. Mr. Babb was an apprentice in the shop at the time, and made the first suggestion that resulted in getting these notes together.

Mr. Knowlton adds the interesting fact that after Shaw had finished his work in Rockland he went to Trinidad, Colorado, where he was engaged in designing mills for treating gold and silver ores. He needed an edge-runner mill such as he had used in Rockland, and sent back to the Knowlton shop to have it made for him. It was built and shipped to Trinidad, the freight charges on the long haul amounting to as much as the first cost of the machine.

Source of Plant Layout

Captain Willis Snow was a boy when the old cement mill was built and operated. Like every normal boy around machinery, he investigated it completely to his own satisfaction, and he must have done it well, for he was able to give a very clear and complete description of the mill and its equipment, and the process of making cement as he saw it carried out. The plant layout shown is based on a sketch made by him. His recollection tallies exactly with what is known of English cement making as it was done at that time.

The old kilns stand now only as monuments to a past that has gone like the men who built them. Yet who shall say that Maine's first cement plant did not have some part, however small, in bringing to the Rockland district the newest addition to Maine's industrial life?

Steam Flow Rule for Any Pipe Size and Any Steam Velocity

Below is given a very simple rule which will permit the calculation of the amount of steam that any pipe will carry, the velocity of steam through the pipe and the pipe diameter being known.

Six thousand feet per minute is the most common velocity allowed for steam. However, sometimes higher velocities are required and sometimes lower velocities are desirable. The rule can be altered to take care of any velocity. It is as follows:

> "Square the internal diameter of the pipe in inches, and multiply by 5.46. Then divide by the specific volume of the steam in cubic feet per pound."

This rule gives the total number of pounds of steam that will be carried by the pipe at a velocity of 1,000 ft. per minute.

For 2,000 ft. per min. multiply by 10.92 instead of 5.46;
For 3,000 ft. per min. multiply by 16.38 instead of 5.46;
For 4,000 ft. per min. multiply by 21.84 instead of 5.46;
For 5,000 ft. per min. multiply by 27.30 instead of 5.46;
For 6,000 ft. per min. multiply by 32.76 instead of 5.46;
For 7,000 ft. per min. multiply by 38.22 instead of 5.46;
For 8,000 ft. per min. multiply by 43.68 instead of 5.46;
For 9,000 ft. per min. multiply by 49.14 instead of 5.46;
For 10,000 ft. per min. multiply by 54.60 instead of 5.46.

For example, how many pounds of steam at 200 lbs. absolute pressure per square inch, will flow through a pipe whose internal diameter is 4 in.? This is a typical problem.

First, look up the "specific volume" of 200-lb. steam. You will find it in any first-class steam table. "Specific volume" is the number of cubic feet occupied by 1 lb. of steam. The greater the pressure, the less the specific volume, of course, because at high pressures the steam is confined into smaller space.

You will find in your steam table that at 200 lbs. absolute pressure, 1 lb. of steam occupies 2.29 cu. ft. You therefore simply multiply 4 by 4, then by 5.46, and lastly divide by 2.29. The result is 38.1 lbs. of steam per minute at 1,000 ft. velocity.

For other velocities, use the figures given above in place of the 5.46. In the event that you should want the velocity to be an intermediate figure, such as 4,500 ft. per min., multiply the 1,000 rate by 4.5.

Bituminous Coal Stocks Shown to Be Normal

Bituminous coal stocks in the United States are now about normal. There is no apparent reason for increasing stocks as even with the increase in demand due to the heating load coming on this fall and even if there was an increased demand due to better business, the present potential production could easily take care of all requirements. In practically all parts of the United States, car shortage is a thing of the past due to the present efficient operation of the railroads, according to the National Association of Purchasing Agents.

On August 1st, anthracite and bituminous coal stocks in industries in the United States and Canada showed a decline of 1 1/3 million net tons from last month. Total stocks of both anthracite and bituminous in the United States and Canada as of August 1st were slightly less than 40 million tons.

Consumption increased approximately 750,000 tons during the month of July as compared with June to approximately 33½ million tons, making the number of days supply of coal on hand 36 days. Consumption in July, 1928, was almost identical with consumption in July, 1927, or one year ago.

Bituminous coal production increased in July as compared with June 313,000 tons, due to the extra day in the month.

Anthracite production increased approximately 200,000 tons over the preceding month.

~ EDITORIAL ~

Cement Delivery Facilities

ECONOMICAL distribution of cement has, of recent years, been one of the first considerations in the location of the new cement plants. The growing volume of truck deliveries and the use of tank boats for transporting bulk cement to centrally located silos and packing plants are developments that indicate the efforts being made by cement manufacturers to improve their facilities for delivering cement to the user.

In this present buyers' market such efforts constitute an important sales advantage. They strike at two items that the buyer considers important—delivery costs and convenience. They are in line with the trend of all progressive business today, namely, that the entire transaction must be considered principally from the buyers' viewpoint.

The delivery of bulk cement direct from the boat to the mixer bins at the site of the new Merchandise Mart in Chicago (as described on another page in this issue) is a further development of the same central idea. Again the buyer was benefited by this method of delivery.

Delivery of bulk cement direct from the boat is, of course, limited to locations adjacent to navigable water. But the central idea of such deliveries under other conditions is not impossible of realization. It would not be impossible to apply this principle to the use of tank railway cars. Already special truck bodies have been developed for the purpose of hauling bulk cement from the mill to the consumer. An adaptation of this design to railway cars may not be impractical.

The fact that a portable pump is being developed which will unload bulk cement from cars or trucks direct into mixer bins makes such a procedure more feasible. Many concrete products plants, central mixing plants and even many large industrial construction and pavement projects are so located that the mixers and material bins are adjacent to railway sidings on which the tank cars of bulk cement could be spotted for unloading.

It is inevitable that developments such as these, which are in line with the trend to serve the buyer, will spread. The increasing use of the paper bag for transporting sacked cement is an example of the growth of a movement that has the buyers' convenience as its principal object. In the field of bulk cement deliveries also, the buyer is the one who benefits most. And the manufacturer who takes advantage of such trends is the one who secures for himself the sales advantages that follow.

An Efficiency Campaign

THE safety campaigns that have been conducted in cement mills throughout the country have not only been successful in conserving the lives and well being of mill employees; they have likewise been a remarkable demonstration of what can be accomplished by an educational campaign that appeals to the initiative of the individual workman for its result.

A similar campaign intended to increase operating efficiency might well prove equally successful. If the average mill employee could be made to understand that every bit of wasted material or energy, that every unnecessary expense of any kind, simply adds to the cost of his mill's output, and so increases the difficulty of selling that cement against competition in an already flooded market, he would, in all likelihood, make a consistent effort to help raise the standard of operating efficiency in his mill. It wouldn't require any very elaborate reasoning to make clear to most employees that any increase in sales difficulty, and the resulting decrease in the amount of sales, is going to cut into the operating time of the plant, and so lessen each employee's yearly earnings.

It might not be the easiest thing in the world to put such a plan into operation. The question of efficiency standards, the difference between negligence and chance, the organizing of suitable committees and a program of activities, and other such practical points would need to be worked out. But in spite of such obstacles, the idea of the campaign still seems feasible.

Foreign Cement Competition

PROGRESS in solving the problem of cement imports will come most surely when all men whose interests touch those of the cement industry either directly or indirectly are given all the facts relating to this subject.

In an attempt to carry the viewpoint of the cement manufacturers to the ***users*** of cement, we have published an article under the title "Foreign Cement Competition" in the construction section of this issue. It will be read by men whose primary business is the use of cement.

These men can do much, at least in individual cases, to influence the selection of American-made cement on projects where foreign cement is also available. When they are given the facts frankly and clearly and if they are convinced that it is to their ultimate advantage to use American cement, an important step has been taken toward the solution of the problem.

Keystone Plant at Bath, Pa.

(Continued from page 96)

outlet at the bottom and an air inlet at the top constitute each Pressor. As the slurry enters the Pressor cylinder, a ball float rises. When the cylinder is full, this ball float trips a pilot valve which admits compressed air at 75 lbs. pressure. By means of this compressed air the slurry is forced through a 6-in. pipe to the storage tanks. The Pressors operate continuously, i. e., when one cylinder is being filled with slurry, its companion cylinder is being emptied and vice versa.

By means of this duplex cylinder arrangement a steady and continuous flow of slurry is assured to the mills and the slurry tanks. These Pressors therefore accomplish the function usually performed by Wilfley pumps in other cement plants.

The slurry is stored in six cylindrical tanks each 20 ft. in diameter and 40 ft. high, each tank containing enough slurry to produce 1500 barrels of cement. A complete piping system connects the six slurry storage tanks in such a manner that the contents of one are interchangeable with any other, thus providing facilities for blending the mix as directed by the plant chemist.

Agitation is accomplished by means of compressed air which is blown into the tanks through a series of air inlets which are so arranged that compressed air is delivered to every square inch of the tank area. A device called the Regulex, also made by the Polysius Corporation, automatically switches the compressed air to the various tanks in sequence at regular intervals. This flow of compressed air for slurry agitation can be adjusted to meet changing operating needs.

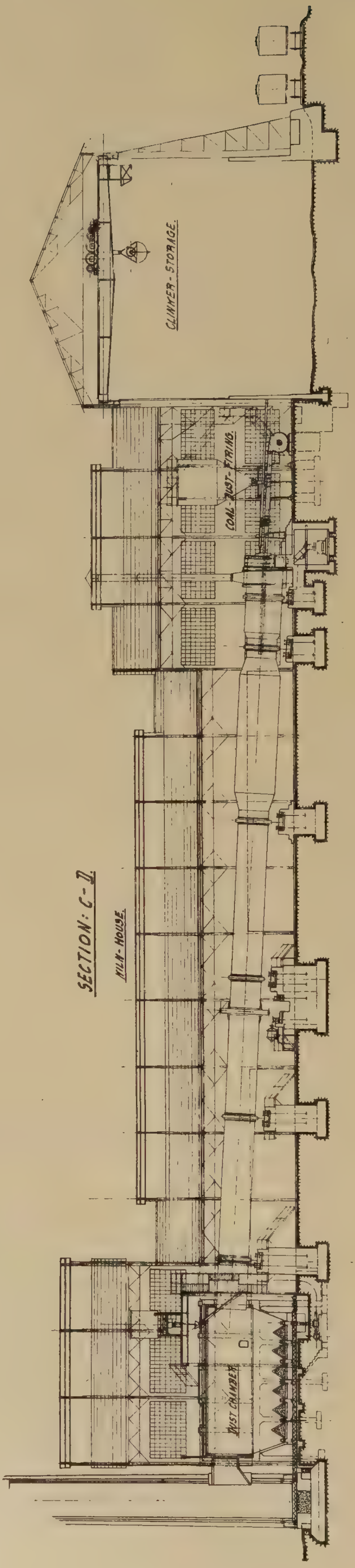
The blended and proportioned slurry is taken from the storage tanks and delivered by another set of Pressors to a second group of slurry storage silos. There are 2 of these, each being 24 ft. by 40 ft. Compressed air agitation such as described above is supplied to these tanks also. Here any final corrections in composition can be made before the slurry is delivered to the kiln tanks. This final movement of the slurry to the kiln feed tanks is also accomplished by means of Pressors.

For the present 1,000,000 barrel annual installation, two Polysius rotary Solo kilns have been installed. The total length of these kilns is 250 ft., the diameter varying from 10 ft. to 13 ft. 2 in. to 11 ft. These kilns perform the four operations of drying, calcining, clinkering and cooling, all in one continuous operation and all in a single unit. One operator easily controls the output of the 3,000 barrel per day plant. Though the highest temperatures required are almost 3,000 deg. F., the temperature of the gases discharged at the feed end of the kiln are only 700 deg. F. or less.

The slurry, containing 36 per cent of moisture, is fed by gravity directly to the inside of the kiln. A special drying device of Polysius design is provided at the feed end of the kiln to evaporate this water. This device is composed of five sections and has a total length of about 35 ft. It begins at a point about 6 ft. inside the feed end of the kiln and is made up of the following sections:

(1) A section about 5 ft. long, consisting of a single diaphragm which divides the kiln into two semi-circular compartments. The ends of the steel plates from which the diaphragm is made are provided with angles which fasten to the inside of the kiln shell. Four inclined angle lifting shells are fastened at each side of the diaphragm.

(2) A section, also about 5 ft. in length, made up of two diaphragms which divide the kiln into four quadrants. These diaphragms also are made of steel plates and fastened to the inside of the kiln shell by angles. Four inclined angle lifting shells are fastened to the side of these



Section of the kiln housing

diaphragms, one of which will be in direct alignment with the diaphragm in the first section.

(3) A section, about 10 ft. long, divided into eight parabolic compartments arranged longitudinally around an octagonally shaped core which is concentric with the axis of the kiln. Four radial sides of these compartments will be in direct alignment with the diaphragm in section 2. These also are fastened to the inside of the kiln shell.

(4) Another section about 5 ft. long which is the exact duplicate of section 2.

(5) The last section, about 10 ft. long, is an exact duplicate of section 3.

Operation of Drying Device

As the slurry enters the kiln, it is divided into two equal volumes by the diaphragm in section 1, above described. The slope of the kiln, aided by the inclined lifters, advances the slurry to section 2 where it is again divided into four equal volumes. When the slurry leaves section 2 and enters section 3 it is still further divided into eight equal parts.

The hot gases which pass through the octagonally shaped core around the eight compartments in section 3 dry the slurry coming in contact with the parabolic bottoms of the compartments. The dried slurry then falls off these parabolic plates in small nodules which are delivered to the following sections, 4 and 5, where still further drying is accomplished.

When the raw material feed leaves section 5, it has taken the form of small, dry nodules approximately the size of a pea or coffee bean, which are delivered to the calcining zone, where they are subjected to a temperature of about 1800 deg. F.

The next zone is the clinkering zone, where the temperatures range from 2500 deg. F. to 2800 deg F. and in which the material is fused into a clinker. As the hot clinker leaves the clinkering zone it passes into the cooling zone, which communicates directly with the clinkering zone.

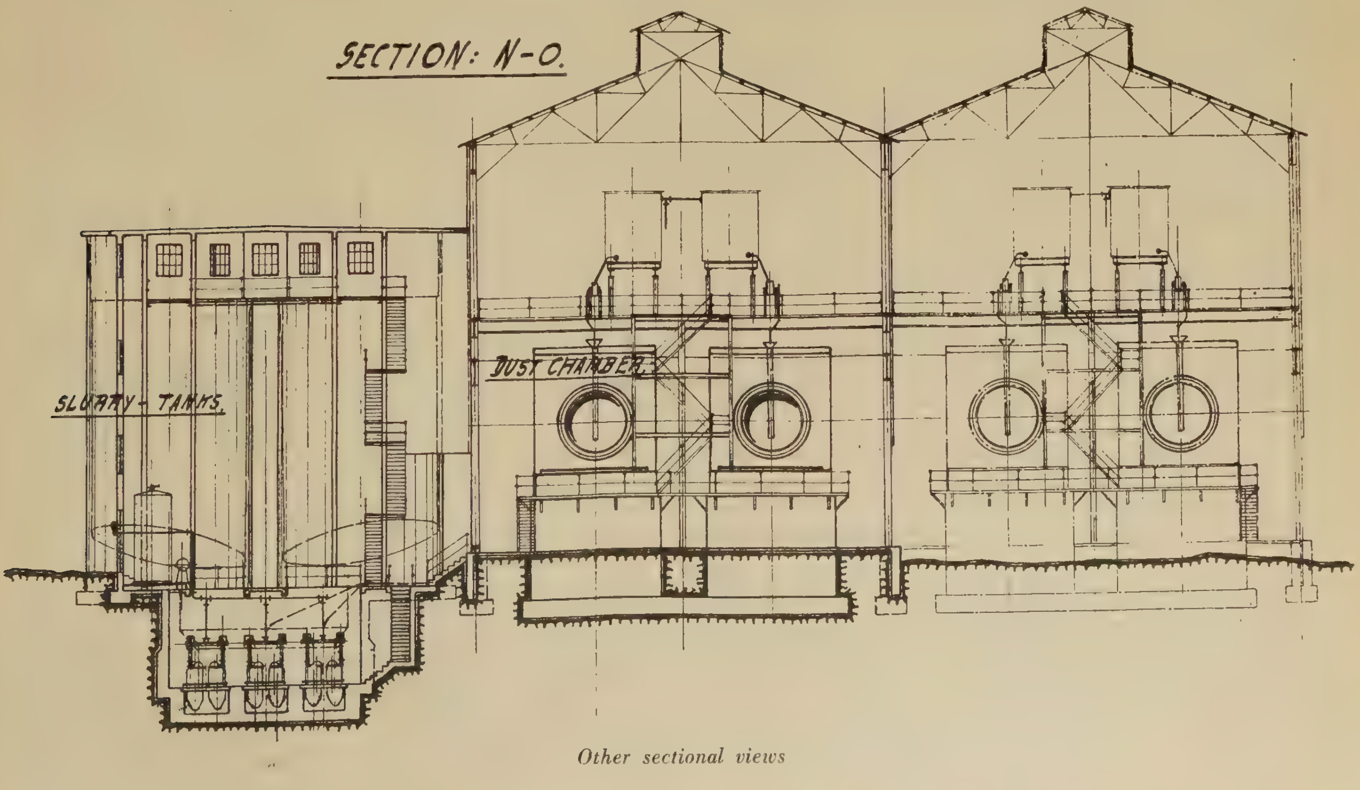
The cooler is provided with shelves which lift and turn the clinker repeatedly, thus exposing it to the cooling action of the air entering the kiln. The final cooling is accomplished in this section of the kiln as the clinker passes through a series of radial compartments built into the interior of the section. It leaves these compartments at a temperature low enough to permit it to be handled mechanically by conveyors and elevators.

Coal Department

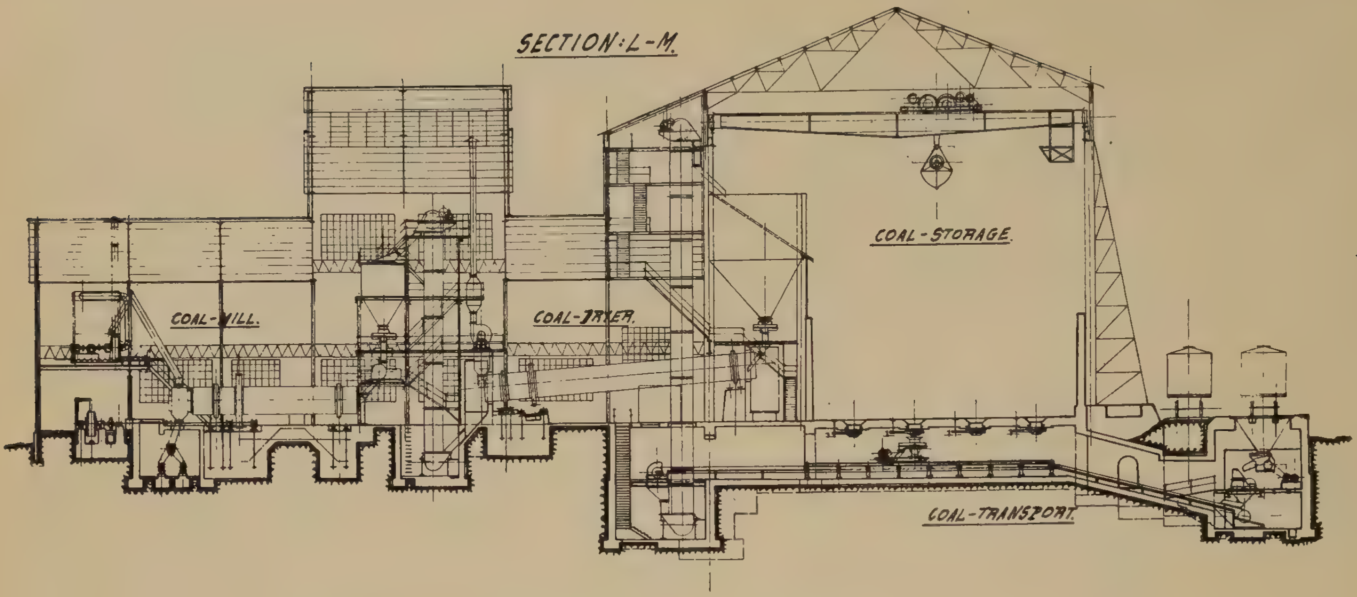
Fuel for the operation of the kilns is supplied by the combustion of pulverized coal. As previously described, the coal is received on the plant siding and is dumped into that section of the general materials storage building reserved for it. The lump coal is fed from storage into a Link-Belt coal crusher which reduces it to about walnut size. It is then passed through a Polysius stoker-fired dryer which removes all but 1½ per cent of moisture.

A Polysius 3-compartment Solo mill grinds the coal to a fine powder, after which a Fuller-Kinyon pump delivers it through a 5-in. steel pipe to the coal storage bins above the kiln. The coal is fed to the kilns by Polysius double-screw feeders.

A jet of air, supplied by a high pressure Polysius blower, carries the pulverized coal in suspension to the nozzle at the burning end of the kiln. A special waste gas scrubber or washer has been installed at the discharge end of the coal dryer. It consists of two vertical cylindrical washing chambers, one above the other and connected in series with a suction fan between the two chambers. The lower chamber is piped direct to the dryer stack housing or to the smoke chamber, and by extending upward into the chamber, draws the waste gases and the fine coal dust from the dryer into the lower chamber. A conical cap provided on this pipe deflects the gases and dust toward the cylindrical shell of the washing chamber. Water spraying through a series of nozzles located in the chamber above the cap of the smoke inlet pipe produces a dense, penetrating mist which completely fills the washing chamber. As the dust-laden gases pass through this dense mist they are thoroughly scrubbed and the coal dust is precipitated to the bottom of the chamber from which it flows through a pipe to a settling basin. Leaving the



Other sectional views



Sectional views of the coal department

lower washing chamber, the scrubbed gas enters the dryer suction fan, which forces it into the second washing chamber. Here the gas is again scrubbed by a series of water sprays and any coal dust that may have been carried beyond the first washing chamber is precipitated and carried to the settling basin.

After the waste gas has passed through this second chamber it is discharged to the atmosphere free from dust.

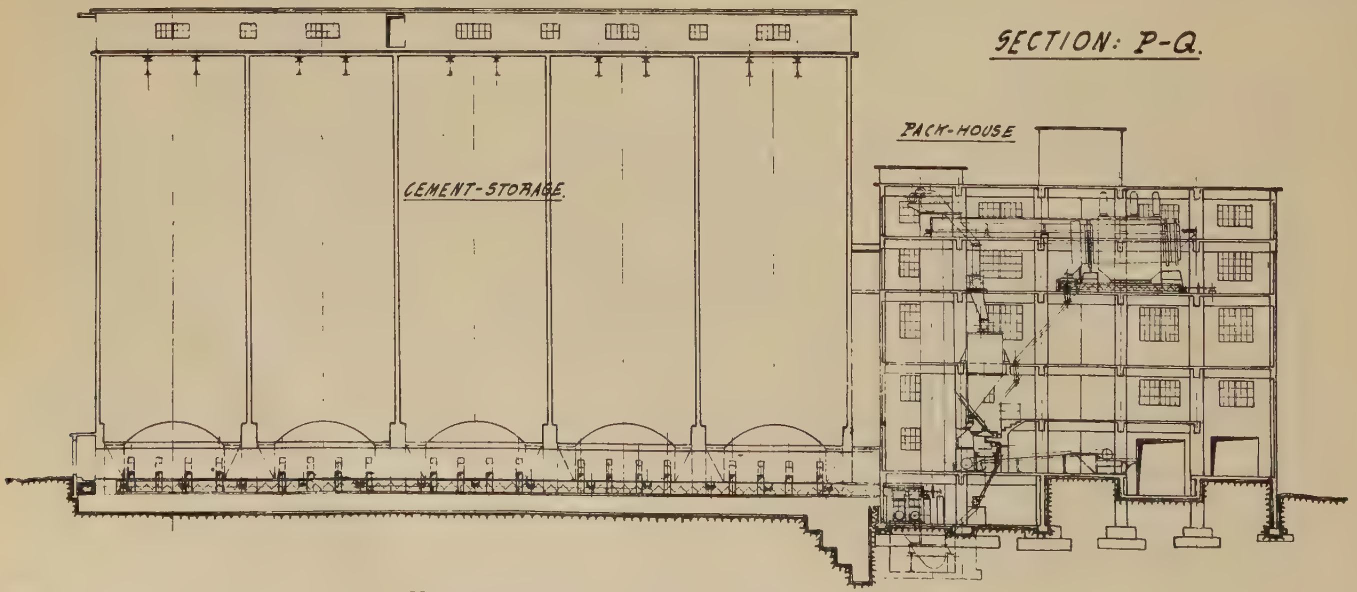
Cement Storage

Ten circular concrete silos, each 30 ft. in diameter and 90 ft. in height, provide storage for approximately 200,000 barrels of finished cement. The storage silos are provided with equipment making it possible to blend the cement in all the storage silos continuously. A system of conveyors and elevators delivers the cement from the silos to the four Bates Valve bagging machines. Railroad cars are loaded by means of belt conveyors which take the loaded bags direct from the packing machine to the railroad cars. A Bethlehem Foundry and Machine Company bag cleaner is installed.

It was desired to make this plant as free from dust as possible. The system installed is of Polysius make throughout. A long gas-expansion and dust-precipitating chamber is provided between the kilns and the stacks to make the stack gases free from dust. This chamber discharges into concrete stacks 10 ft. in diameter and 200 ft. high provided for each kiln. The stacks are connected to the kilns they serve by 50-ft. flues with hoppered bottoms and flat suspended brick arches. Polysius gates are installed at the bottoms of these hoppers to reclaim the precipitated dust which is taken by a screw conveyor to a Fuller-Kinyon transport system and delivered back to the raw grinding mills where it is reground and mixed with the new raw material. The finish grinding and the coal grinding mills are provided with Polysius suction type filtering dust collectors. These collectors consist of a steel housing in which a series of filter tubes, arranged in individual sections, are suspended.

A Polysius exhaust fan draws the dust laden gases from the milling units, through the filter tubes and discharges the gases free from dust into the atmosphere. A patented device provides for filtering the tubes and returning the dust to the conveying system.

Power is supplied by the Pennsylvania Power and Light Company of Allentown. It is received at the plant through



Showing sections of the cement storage and pack-house a complete transformer station and a switchboard which serves all the mill departments.

In the power station there are also installed rotary converters and Chicago Pneumatic Tool Company air compressors for supplying compressed air to transport the slurry and operate the slurry agitators and the Fuller-Kinyon transport systems.

The laboratory, store room and repair shops are located in a building adjacent to the transformer station and convenient to all departments of the plant. Water for operating the plant is obtained from a creek which passes through the property. A natural reservoir stores sufficient water to assure an ample supply for manufacturing purposes. Auxiliary buildings are of steel frame with concrete brick panel walls and concrete tile roofs.

The general contractor on the construction of the plant was M. A. Long of Baltimore, Maryland, and Richard K. Meade, also of Baltimore, was the consulting engineer.

J. Barnes is president of the Keystone Portland Cement Company, F. B. Franks is vice-president and general manager, W. J. Swegman is superintendent and chief engineer. Other officials are Mr. Bass, chief chemist, and Mr. Hilles, sales manager.

Instruction on Diesel Engine Offered by Institute

In order to meet the demand for information concerning the principles and operation of the Diesel engine, the Polytechnic Institute of Brooklyn, N. Y., has made announcement of an evening course in Diesel engines. The Polytechnic Diesel engine course is not part of the regular undergraduate work of the Institute, but is designed solely for the man interested in oil engines, regardless of his previous education. Twenty two-hour lectures are given during the winter every Tuesday evening at 7:30, beginning with the last Tuesday in September.

This course was first given in 1923 and since that time some 400 men, representing a large variety of occupations, have taken advantage of it. To meet the needs of those who wish to train themselves for operating, building, selling or designing oil engines the lecture course is supplemented by class room exercises and laboratory periods. Several varieties of oil engines are available in the laboratory for demonstration and testing. Students enrolling for this work will meet every Monday evening, alternating each week between the laboratory and the classroom.

Direct and personal supervision of the conduct of the course is in the hands of Professor E. F. Church, Jr., head of the department of mechanical engineering. The lectures are prepared and delivered by Edgar J. Kates, consulting engineer and chairman of the oil and gas power division, American Society of Mechanical Engineers. Professor W. J. Moore of the Polytechnic Institute is in charge of the laboratory exercises and demonstrations. Assistant Professor Frank D. Carvin conducts the classroom discussion and tests.

Effect of Stemming on the Efficiency of Explosives

In view of certain instances of a remarkable increase in the efficiency of explosives due to the use of stemming, which have come to the attention of the United States Bureau of Mines, a new edition of Technical Paper 17, dealing with this subject, has been issued, containing the details of these instances.

One company reports that, with the use of stemming, a test has shown a saving in powder consumption of approximately 20 per cent. Another company reports that the result of a three months' test in the stopes showed a saving in the consumption of explosives amounting to almost 25 per cent.

The full benefit of "stemming" will only be obtained if systematically enforced throughout a mine. It is necessary to provide plenty of suitable material at some convenient point, so that there is no excuse for not using it. This, however, is not all; intelligent and interested supervision is necessary to insure its general use and to overcome the passive resistance that many men offer to all innovations.

Copies of Technical Paper 17, "The Effect of Stemming on the Efficiency of Explosives," may be obtained from the United States Bureau of Mines, Department of Commerce, Washington, D. C.

British Plant Building Project Nears Completion

In his address at the annual meeting in London recently of the Associated Portland Cement Manufacturers, Ltd., P. Malcolm Stewart, the chairman, said that the reconstruction program adopted in 1925, when the administration of the company was reorganized, is nearing completion. The policy embodied a modernization of the company's chief works, with the object of raising the effective output to 1,250,000 tons per annum, thereby enabling a material reduction to be made in the costs of manufacture. It was also a part of the program that the improvement in the company's manufacturing position should be effected without any increase of charges or capital.

It was the firm's original intention simply to modernize its two largest works—Bevans and Swanscombe—reconstructing them so as to give an efficiency second to none in the United Kingdom. The firm has completed within the two years' period set the task of demolishing the old Bevans works and constructed on the site a vast modern factory claimed to be second to none in Europe. So satisfied was the concern with the wisdom of the decision to reconstruct the Bevan works that, on the completion of the original scheme, it resolved to bring the annual productive capacity up to 500,000 tons, despite the fact that so doing involved some delay in starting on the reconstruction of the Swanscombe works, which is now well in hand and should be completed within 12 months.

An interesting step which has just been taken by the firm is the establishment of a profit-sharing bonus scheme for the benefit of the employees. In this scheme all employees will participate who will have completed two years of service and upward on December 1st next to the satisfaction of the management and are 21 years of age. The bonus will apply to all qualified employees who do not now receive a bonus and will take the place of the gratuity which the firm has for the past three years distributed at Christmas.

The amount of the bonus is at the rate of the average dividend paid on the aggregate capital of the Associated and British Portland Cement companies. Each qualified employee is assumed to hold five ordinary shares in respect of each year of service up to ten years. Thus a qualified employee of two years' service would be credited with ten notional common shares, of three years' service with 15 shares, and so on up to 50 notional shares with ten years' service. The system is similar to one inaugurated by P. Malcolm Stewart, chairman of the Associated Company, in another company, where it has proved successful.

Rapid-Hardening Cement in Jetty Construction

An interesting account of the construction of a deep-water jetty for the Associated Portland Cement Manufacturers at Bevan's Cement Works, Northfleet, England, was given recently by C. P. Taylor and Dr. Oscar Faber at the Institution of Civil Engineers, London. The design is of special importance as considerable pioneer work was embodied in it.

The reinforced concrete piles as driven were 18 inches square and up to 67 feet long, and weighed about ten tons each, two-thirds of them having an incline of 1 to 3. The blow required for driving them was 20 ft.-tons (a 4-ton monkey dropping 5 feet) and the set ranged from 1/10-inch to 1/20-inch per blow. They were driven largely through solid chalk to a penetration never less than 12 feet and in some cases amounting to about 45 feet. The work was probably one of the first of its kind for which rapid-hardening cement was used. The specification required the concrete to attain a cube crushing strength of not less than 3,000 lbs. per sq. in. at the age of seven days. The actual results varied from 3,000 pounds to 4,500 pounds. It was specified that no objection would be raised to the handling and driving of the piles after a period of seven days, nor to a removal of the centering under beams and slabs at the same time. The design of the jetty was specially directed toward obtaining lateral strength and stiffness in the concrete structure, to resist the blow of ships, and the fenders were designed to secure resilience instead of being firmly fixed to the structure.

The original plans called for a jetty having 16 feet of water at low tide, and thus suitable for berthing ordinary coasting steamers of moderate capacity at any tide. Soon after the work was begun it was thought desirable to consider plans for accommodating ocean-going vessels, and a minimum depth of 26 feet at low water was decided upon. In view of this change of plan the designs had to be approached largely from the viewpoint of rapid construction. The jetty is at present connected to the shore only by gangways and a conveying gantry, the whole of the materials being handled by cranes and conveyors. The structure was therefore designed primarily as a crane platform and as a mooring for ships. The absence of any rigid connection to the shore necessitated special consideration as regards stiffness, which had to be provided entirely in the structure of the jetty itself.

While many engineers have preferred cylinders for structures of this sort, it is extremely difficult to get any adequate bracing below low water. Bracing between deck-level and low water is not alone effective in securing a rigid structure, and it was chiefly on these grounds that the system involving piles with a heavy incline was advised, although in the opinion of Messrs. Taylor and Faber more rapid construction was also obtained. It had also the advantage that no exposure of pile reinforcement was necessary below high water, and that the tidal work was restricted to one horizontal slab for each group of piles, though this did not apply fully where piles had to be lengthened.

The site provided deep water within a short distance of the existing wharves, but it was necessary to dredge about 45,000 cubic yards in order to secure a depth of 26 feet along the whole front. The dredging was completed before the work of construction began. The original design provided for dredging to a slope inside the front piles, but the contractor preferred to cut steps, and this had some advantage, as the inner piles could all be pitched on a level bottom instead of on a slope.

The horizontal force produced on a jetty during the impact of a ship is a matter on which no exact data exist, and there must be wide variations, depending on the speed of the ship, the intensity of the wind, the area exposed to wind by the ship, and especially the design of the jetty and its fenders, a design allowing for considerable yield having the effect of reducing the force of impact compared with a rigid design where the force would be very high. In the present design some yield under impact is provided by the deflection of the fender piles, which are purposely kept away from the jetty's main structure and are unsupported between the deck and the ground, a distance of some 53 feet, so as to allow considerable deflection. The necessary strength is obtained by bolting three 14- by 14-inch Oregon pine piles together and placing the group with the narrow side towards the impact. Additional yield is provided for by allowing the tops of the piles to move in a slot in the jetty. This is particularly useful where the impact occurs at high tide near the tops of the piles where the deflection of the piles would be insufficient.

Working on Rights for Projected Plant at Volcano, Calif.

The preliminary work of surveying and securing land rights is proceeding for the projected cement plant at Volcano, near Stockton, Calif. The backers are unnamed, being referred to merely as an eastern firm. During the latter part of August signatures of land owners along the south side of Sutter Creek from the city of Sutter Creek to the town of Volcano were obtained for the purpose of securing options to purchase rights-of-way for a railway line.

If present plans are realized, the road and extension of the line from the town of Ione will be of the broad gauge type and extend from that place to Sutter Creek. Up to this point the line will be built by the Southern Pacific Company and beyond that, to the plant at Volcano, by the cement interests. All options are to be exercised by January, 1929.

Duty on Cement Receiving Attention of American Mining Congress

The question of duty on imported cement is receiving the attention of the American Mining Congress, Washington, D. C., in its consideration of tariff duties to protect American industry and labor.

During the last tariff revision by Congress in 1922, the American Mining Congress prepared and made available to the congressional committees handling the bill, data bearing on over 60 mineral products on which Congress levied an import duty. Since then this organization has kept current data on all mineral tariffs with a view of submitting similar data on cement and other products when Congress again takes up tariff revision legislation.

Lehigh Dividend

The Lehigh Portland Cement Company has declared its regular quarterly dividend of $1.75 on preferred stock, payable October 1st to stock of record September 14th.

Net profit for the fiscal year ended August 31st was announced on September 10th as $3,814,393 after all charges and federal taxes.

Seattle Plant Half Completed

Officers of Pacific Coast Cement Company Visit Plant and Note Progress—Anticipate First Production in December—Transportation Units

WALTER BARNUM, New York, president of the Pacific Coast Company, recently visited Seattle for the purpose of viewing the progress of the work of constructing Seattle's newest industrial plant, the 1,200,000 barrel plant of the Pacific Coast Cement Co., a subsidiary of the Pacific Coast Company. The project is 60 per cent completed.

The first barrel of Diamond portland cement will be made in December, it is stated by company officials. The engineering and laboratory testing departments of the new company have already moved into their new cement stucco building. Crews of workmen are setting the 240-ft kilns and the 45-ft. grinding mills. Cement silos for storage of cement and the bag house have just been started.

Together with Mr. Barnum on the recent inspection trip over the site of the new plant there were F. E. Dodge, engineer of the Cowham Engineering Co. of Chicago, and Arthur Wells, consulting engineer of the Pacific Coast Co., of New York.

The 200-ft. chimney of portland cement has been completed on the 20-acre plant site. One of the 240-ft. kilns has been put into place, and sections for the second kiln are on the ground. The work of construction is progressing according to schedule.

Associated with the Pacific Coast Cement Co. in the production of cement is the Pacific Coast Railroad, a member of the official family of the Pacific Coast Co. This railroad runs from the coal mines of the Pacific Coast Coal Co., another subsidiary, to the cement plant and will haul the coal for the cement plant.

A third unit of the system is the Pacific Coast Steamship Co., which has not operated vessels since 1927, but this summer returned to active work through acquisition of two steel steamships for the transport of limerock from the Alaskan quarries of the company to Seattle.

Nazareth District Plants Make Good Showing in Local No-Accident Drive

Encouraging results were secured by the Nazareth district of the Lehigh Valley Safety Council in the strenuous "no-accident" campaign closed on the morning of September 1st and conducted through the three preceding months. Although the objective, that of having no lost-time accident during the three months, was not attained, every participating plant either equalled or improved on its 1927 record.

The comparison of lost-time accidents for the years 1927 and 1928 is as follows:

	1927	1928
Nazareth Cement Co.	1	1
Lone Star Cement Co.	6	1
Hercules Cement Corp.	4	0
Penn Dixie Cement Corp. Plant 4	7	0
Penn Dixie Cement Corp. Plant 5	1	1
Penn Dixie Cement Corp. Plant 6	1	0
Penn Dixie Cement Corp. Plant 7	0	0
Total	20	3

The above photograph shows part of the construction work on the 20-acre tide water tract of the Pacific Coast Cement Co., at Seattle, Washington, where the new 1,200,000 barrel cement plant is under way. One of the 240-ft. kilns is shown in place, and a section of a second ready for placing. On the extreme right is one of the three 45-ft. mills.

MEN and MILLS

Notes from the Field

Providence, R. I., Port for Japanese Steamer

Foreign cement entered the United States recently by way of Providence, R. I., when the Japanese steamship *Naples Maru* docked at the State pier there. The *Naples Maru* left Antwerp, Belgium, on August 9th, docking September 3rd.

With a crew of 36, it arrived at Providence from Boston, where it had previously discharged 4500 tons of cement. The remainder of its cargo, 3053 tons of cement, were consigned to the Industrial Trust Company at the former point. This ship, which is of 5825 gross tons, is one of 60 transoceanic steamers owned by the Koku Sai Line of Kobe, Japan.

Huron Opens Bagging Plant at Buffalo, New York

The Huron Portland Cement Company has opened its 150,000 barrel storage and bagging plant at Buffalo, New York. Here bulk cement manufactured at the Alpena, Mich., plant is received and distributed. The practice heretofore has been to ship the sacked cement direct from the plant.

Tabulation of September and October Accidents for Last Three Years

Statistics compiled by the Portland Cement Association and tabulated below show the rates of accidents according to departments for the two months of September and October in the years 1925, 1926 and 1927.

Duluth Plant of Universal Awarded Trophy

Awarding of the safety record trophy to the Duluth plant of the Universal Portland Cement Company took place recently in front of the office of the plant. The ceremonies were witnessed by 400 employees of the plant and a large number of visitors. The trophy was awarded to the Duluth plant because of its 1927 safety record. This is the second time that the Duluth plant has won these honors, having won them for a safety record in 1925 for having not one lost-time accident to its record. The Duluth plant is the only one to have won the trophy twice for good safety work in the United States.

G. M. Davis, who is safety commissioner for the Universal Portland Cement Company at Chicago made the presentation to Ray S. Huey, superintendent at the Duluth plant. City officials of Duluth who spoke at ceremonies were as follows: Mayor S. F. Snively, Commissioners W. S. McCormick and C. Evens, and E. H. Barber, chief of police.

In 1926 only two lost-time accidents occurred, and in February, 1928, only one. Only three lost-time accidents have occurred during the last four years.

Following the presentation a splendid athletic and picnic program was held. A diamond ball game between the office men and the mill men was the feature attraction of the athletic program. The mill men won over the office men by a score of 13 to 10. The victorious mill men had the following lineup on their teams: B. Green, C. Anderson, E. Fectner, L. Hubert, F. Beedy, D. Robinson, W. Ramsey, G. Kreuger, F. Benassi and N. Cappra. The defeated office team had the following men in their team: C. Dutzka, E. Staley, A. Shay, A. Cyr, E. Lowe, J. Furlong, A. Rogers, E. Amon, H. Anderson and H. Lundgren. The umpire was J. Myhrman.

Chelsea Night Guard Head Injured at Crossing

Charles Tustistion, 55, in charge of the night guard at the Michigan State cement plant at Chelsea, was perhaps fatally injured early in the morning of August 11th when the auto he was driving ran into a Michigan Central passenger train near the plant. It is believed the brakes of the motor car failed to work as Tustistion crashed into the side of the engine as it passed the crossing.

Former Saylor Stationary Engineer Dies

George B. Woodring, 65, said to be the first cement plant stationary engineer in the United States, died September 17th at his home at Northampton, Pa.

Mr. Woodring, when quite young, served as a stationary engineer for the David Saylor Company for 11 years, after which he severed his connection with the cement industry. He was born at Hanoverville. His retirement took place August 31st of this year.

Mr. Woodring took an active part in civic affairs and had been prevailed upon to serve as a member of the local council, an office which he held for one term.

SEPTEMBER AND OCTOBER ACCIDENTS

	1925					1926					1927				
Department	Annual Total	Sept.	% of Total	Oct.	% of Total	Annual Total	Sept.	% of Total	Oct.	% of Total	Annual Total	Sept.	% of Total	Oct.	% of Total
Quarry	512	35	6.8	53	10.4	465	39	8.4	40	8.6	279	29	10.4	22	7.9
Crushing	111	10	9.0	9	8.1	124	9	7.3	11	8.9	61	3	4.9	6	9.8
Coal Grinding	105	10	9.5	10	9.5	76	4	5.3	7	9.2	61	7	11.5	6	9.8
Raw	289	24	8.3	19	6.6	213	18	8.5	12	5.6	137	13	9.5	6	4.4
Burning	239	17	7.1	20	8.4	245	28	11.4	18	7.3	169	13	7.7	13	7.7
Finishing	239	13	5.4	26	10.9	191	12	6.3	17	8.9	95	13	13.7	4	4.2
Cement Storage	24	5	20.8	4	16.7	17	1	5.9	4	23.5	19	2	10.5	4	21.1
Packing and shipping	283	26	9.2	32	11.3	216	20	9.3	37	17.1	195	20	10.3	27	13.8
Power	138	12	8.7	11	8.0	132	8	6.1	12	9.1	74	7	9.5	5	6.8
Shops	233	19	8.2	15	6.4	170	18	10.5	10	5.9	85	7	8.2	7	8.2
Store room	10	5	50.0	—	—	12	—	—	2	16.6	4	—	—	—	—
Railroad	60	3	5.0	10	16.6	53	—	—	1	1.9	36	—	—	6	16.7
Yard	302	25	8.3	26	8.6	238	17	7.1	13	5.5	140	7	5.0	21	15.0
Offices—Laboratory	18	2	11.1	1	5.6	10	—	—	2	20.0	7	—	—	1	14.2
Other than above	39	9	2.3	23	58.9	—	—	—	—	—	4	1	25.0	1	25.0
Outside Co. property						7	4	57.1	1	14.2	8	1	12.5	2	25.0
Docks						14	3	21.4	—	—	—	—	—	—	—
	2602	215	8.27	259	9.95	2221	181	8.15	187	8.42	1379	123	8.92	131	9.50

Kingsport Plant Receives First Aid Instruction

Employees of the Kingsport plant of the Pennsylvania-Dixie Cement Corporation met recently to discuss safety and to hear more about safety from Jas. M. Webb of the Bureau of Mines, stationed at Knoxville, Tenn. Two meetings were held—Tuesday, July 24th, and Wednesday, July 25th. Mr. Webb also spoke to the employees of the quarry at Marcem, Virginia.

The first session at the Kingsport plant office was devoted to a few remarks in connection with safety. Following introductory remarks concerning the necessity and value of safe practices, Mr. Webb gave a demonstration of the prone pressure method of resuscitation. The following day's talk was confined primarily to safety suggestions and first aid methods.

Ship Canal Holdings

In reviewing the holdings of the Associated Anglo-Atlantic Corporation in the cement industry, it was disclosed at a recent annual meeting that the corporation owns a controlling interest in the Ship Canal Cement Company, Ltd., which in turn controls the cement manufacturing firm of Greaves, Bull and Lakin. The earnings, good-will, and efficiency of these plants were described in optimistic terms.

It was said also that through connection with the British Cement Products and Finance Company, the corporation had been able to participate in various other kinds of business with favorable results.

Franks Offers Cement to Improve Allentown Street

Fred B. Franks, Sr., of the Keystone Portland Cement Company, while visiting the mayor of Allentown, Pa., of which he is a resident, offered to donate the cement to pave Club Avenue, one of the city's streets. Provision, however, is made that the city pave the street beyond the point to be improved with Mr. Franks' cement.

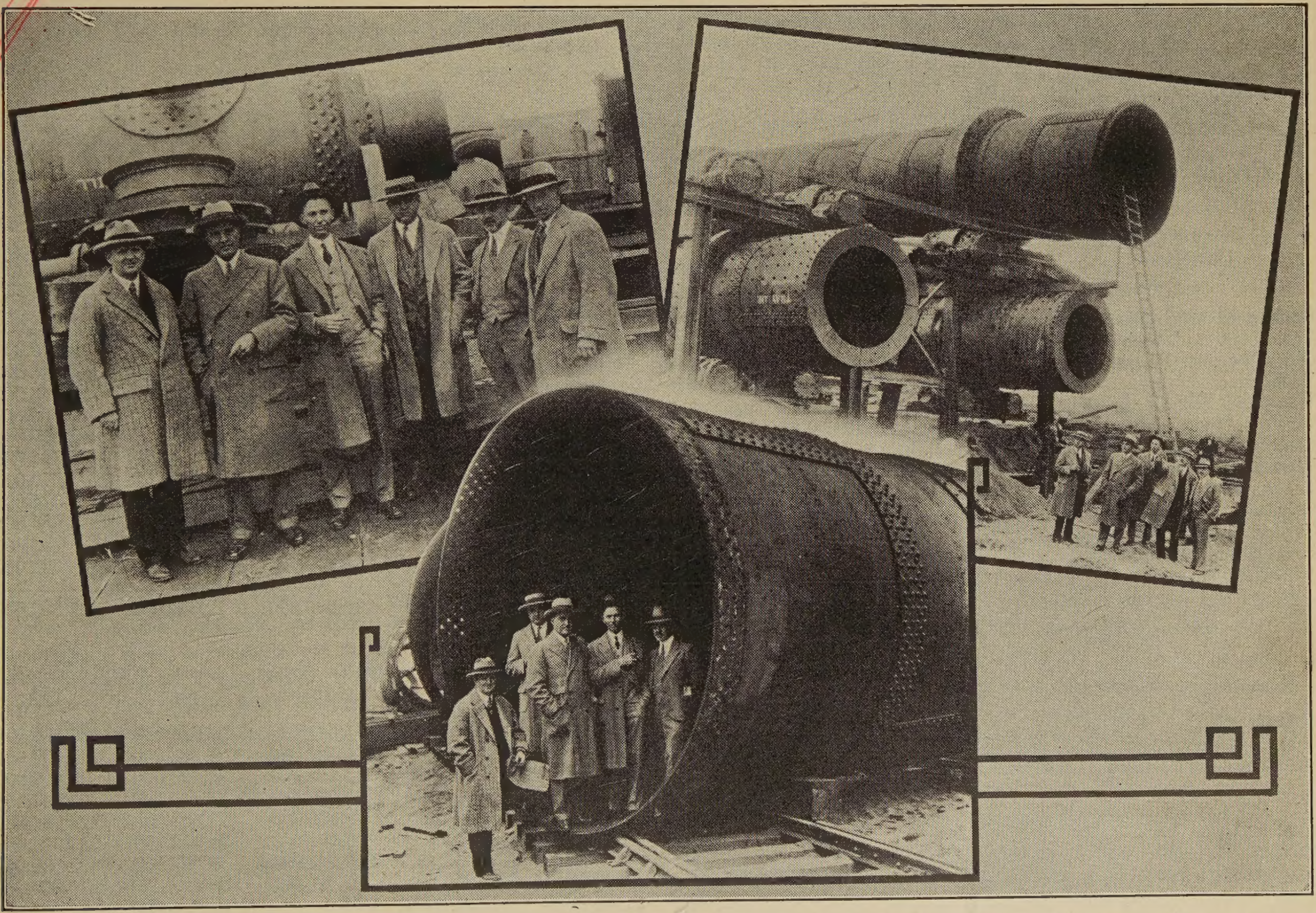
Among Mr. Franks' other activities in this direction was the construction recently of a stretch of concrete pavement at a busy intersection at Bethlehem, Pa., when cement produced in the new Keystone plant was used.

The pavement was opened within 24 hours after placing, when a weighted truck was run over it. At Mr. Frank's invitation numerous city officials and other persons attended.

Construct Brick Storage Building at Thomaston Plant

Work is to be started soon on a brick storage shed, 30 by 100 ft., at the Lawrence Portland Cement plant at Thomaston, Maine. The building will be of concrete construction, and will be used for storage of brick linings for the kilns and coolers.

Buildings belonging to the commissary department during construction of the plant are to be retained on the premises. They have been permanently placed, sealed rear and ends, and will be given a surface of gunite and then placed at the disposal of the workmen as garages.



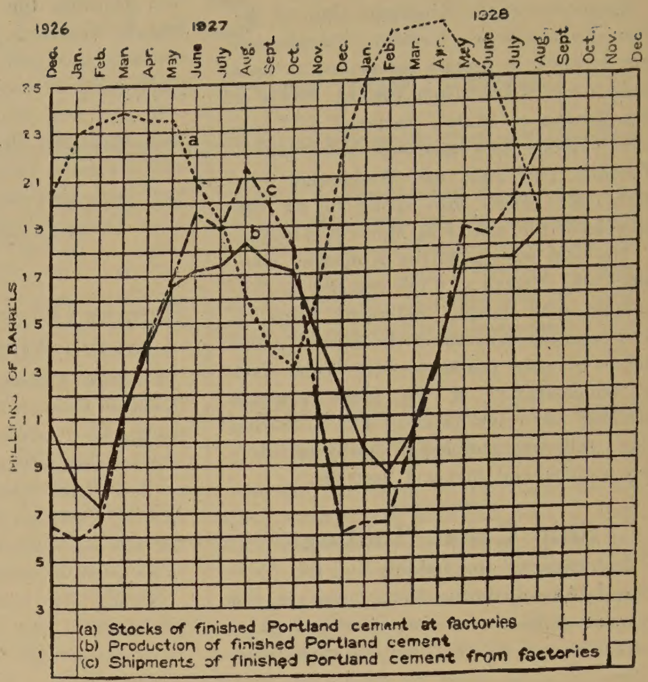
A group of officials of the Pacific Coast Company and of the Pacific Coast Cement Co., a subsidiary, is shown on the site of the 1,200,000 barrel cement plant now under construction at Seattle, Washington. In the left picture are shown, reading from left to right, N. D. Moore, vice-president of the Pacific Coast Cement Co.; Walter Barnum, president of the Pacific Coast Co.; F. E. Dodge, engineer, Cowham Engineering Co. of Chicago; Arthur Wells of New York, consulting engineer of the Pacific Coast Cement Company; Maj. S. E. Hutton, general engineer of the Pacific Coast Cement Co. in charge of the construction of the cement plant; and Darwin Meisnest, assistant sales manager of the Pacific Coast Cement Co. In the picture to the right is shown the group inspecting the placing of coolers and kilns, and the lower picture shows the men standing in a section of a kiln about to be placed

Cement Statistics for August

The portland cement industry in August, 1928, produced 18,730,000 barrels, shipped 21,970,000 barrels from the mills, and had in stock at the end of the month 19,340,000 barrels, according to the United States Bureau of Mines, Department of Commerce. The production of portland cement in August, 1928, showed an increase of 2.3 per cent and shipments an increase of 2.6 per cent, as compared with August, 1927. Portland cement stocks at the mills were 18.7 per cent higher than a year ago. The total production from January to August, 1928, inclusive, amounts to 113,180,000 barrels, compared with 110,781,000 barrels in the same period of 1927, and the total shipments from January to August, 1928, inclusive, amount to 115,824,000 barrels, compared with 115,170,000 barrels in the same period of 1927.

The output of another new plant, located in Pennsylvania, is included in the statistics here presented, which are compiled from reports for August from all manufacturing plants except two for which estimates have been included in lieu of actual returns.

In the following statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 159 plants at the close of August, 1928, and of 150 plants at the close of August, 1927.



Relation of Production to Capacity

	August 1928	August 1927	July 1928	June 1928	May 1928
	Per cent	Per cent	Per cent	Per cent	Per cent
The month	93.1	94.5	87.0	90.1	86.6
The 12 months ended	73.5	74.0	73.7	73.8	73.9

Production, Shipments and Stocks of Finished Portland Cement, by Months and by Districts, 1927 and 1928, and Stocks in July, 1928

District—	Production—Aug.— 1927	Production—Aug.— 1928	Shiments—Aug.— 1927	Shiments—Aug.— 1928	Stocks at end of month 1927	Stocks at end of month 1928	Stocks at end of July, 1928*
Eastern Pennsylvania, New Jersey, Md.	4,255,000	4,015,000	4,484,000	4,403,000	4,007,000	5,524,000	5,913,000
New York and Maine†	1,348,000	1,320,000	1,514,000	1,519,000	1,365,000	1,423,000	1,622,000
Ohio, Western Pa., and West Virginia	1,967,000	2,038,000	2,489,000	2,687,000	2,284,000	2,447,000	3,096,000
Michigan	1,661,000	1,614,000	2,146,000	2,070,000	1,257,000	1,293,000	1,748,000
Wisconsin, Illinois, Indiana and Kentucky	2,492,000	2,537,000	3,119,000	3,076,000	1,231,000	1,967,000	2,506,000
Virginia, Tenn., Ala., Ga., Fla., and La.	1,522,000	1,508,000	1,628,000	1,699,000	1,145,000	1,676,000	1,867,000
Eastern Missouri, Iowa, Minn., and So. Dak.	1,585,000	1,901,000	2,267,000	2,372,000	1,737,000	2,073,000	2,544,000
Western Missouri, Nebraska, Kansas, Okla.	943,000	1,181,000	1,149,000	1,312,000	1,466,000	1,238,000	1,370,000
Texas	496,000	519,000	561,000	623,000	251,000	211,000	314,000
Colorado, Montana, and Utah	216,000	290,000	293,000	364,000	458,000	382,000	456,000
California	1,399,000	1,288,000	1,306,000	1,294,000	718,000	746,000	752,000
Oregon and Washington	431,000	519,000	455,000	551,000	373,000	360,000	392,000
	18,315,000	18,730,000	21,411,000	21,970,000	16,292,000	19,340,000	22,580,000

Month—	Production 1927	Production 1928	Shipments 1927	Shipments 1928	Stocks at end of month 1927	Stocks at end of month 1928
January	8,258,000	9,768,000	5,968,000	6,541,000	22,914,000	25,116,000
February	7,377,000	8,797,000	6,731,000	6,563,000	23,563,000	27,349,000
March	11,450,000	10,223,000	11,100,000	10,135,000	23,922,000	27,445,000
April	14,048,000	13,468,000	14,350,000	13,307,000	23,654,000	27,627,000
May	16,701,000	17,280,000	16,865,000	18,986,000	23,503,000	*25,984,000
June	17,224,000	17,469,000	19,761,000	18,421,000	20,972,000	*25,029,000
July	17,408,000	*17,445,000	18,984,000	*19,901,000	19,397,000	*22,580,000
August	18,315,000	18,730,000	21,411,000	21,970,000	16,292,000	19,340,000
September	17,505,000		19,828,000		13,996,000	
October	17,174,000		18,105,000		13,141,000	
November	14,449,000		11,619,000		16,022,000	
December	11,999,000		6,200,000		22,082,000	
	171,908,000		170,922,000			

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*Revised. †Maine began producing April, 1928, and shipping May, 1928.

With the Manufacturers

NOTES FROM THE FIELD

New Timken Company

Announcement has just been made by the *Timken Roller Bearing Company* of the incorporation of a new company, known as the *Timken Steel and Tube Company*, which will take over the manufacture and selling of Timken steel and tubing. The headquarters and mills are at Canton, Ohio, with sales offices at Chicago, Los Angeles, Detroit and New York. The officers are: H. H. Timken chairman; M. T. Lothrop, president; J. W. Spray, vice president; A. J. Sanford, vice president in charge of sales; J. E. Daily, vice president in charge of operations; and J. F. Strough, secretary and treasurer.

The company has been organized to take care of the growing demand for Timken steel among manufacturers of various products, by the production of high grade alloy steels on a quantity basis. Its production facilities consist of modern furnaces and mills with a capacity of 30,000 tons of steel per month. This capacity is equally divided between electric and open hearth steels. The mill is equipped to supply any section or size of hot rolled bar stock, or seamless tubing, in any quantity desired, an announcement states. Specialized high grade alloy steels can be produced conforming to any analysis specified, with assurance of absolute uniformity.

International Combustion Acquirement

George E. Learnard, president of the *International Combustion Engineering Corporation*, announces the acquisition of the *Hedges-Walsh Weidner Company*, of Chattanooga, Tennessee, a recent combination of the *Casey-Hedges Company* and the *Walsh & Weidner Boiler Company*.

With this new company, International Combustion acquires a large and general boiler business, and augments its present manufacturing facilities with two of the most modern boiler plants in the country, one of which is an outstanding factor in the sectional header boiler field, and the other has facilities for the manufacture of the largest drums which can be made in the United States, an announcement states.

Robt. W. Hunt Engineer

The Robert W. Hunt Company, Chicago, has appointed *C. E. Plummer* as chief chemical and metallurgical engineer. His office will be at the city mentioned.

Mr. Plummer is a graduate chemical engineer of the University of Michigan and holds a master's degree in chemical and metallurgical engineering from the University of Minnesota. He has had a variety of experience in chemical and metallurgical engineering for various mining, smelting and copper companies. He has been connected with the Bureau of Mines, Bureau of Standards and with the Union Carbide and Carbon Company in charge of important work in their research laboratories.

Traylor Engineer

The Traylor Engineering and Manufacturing Company has assigned to its Chicago district sales office *Foster E. Benner*, in the capacity of sales engineer.

Mr. Benner has been connected with the main office at Allentown for a number of years as an engineer, and is conversant with the company's policies, as well as familiar with every detail of the company's business.

Adamant Representative

The Botfield Refractories Co., Philadelphia, Pa., manufacturers of *Adamant* products, announces the appointment of *W. E. Tierney* as its representative in the South and Southwest. Mr. Tierney is a mechanical engineer and a graduate of Tulane University. Mr. Tierney's headquarters will be in New Orleans.

Vulcan Iron Branch Office

Jos. V. Durnin has been appointed manager of a newly established branch office of the *Vulcan Iron Works* at Allentown, Pa.

Mr. Durnin was formerly assistant operating manager of the Coplay Cement Manufacturing Company and has had broad experience in the cement industry.

INDUSTRIAL LITERATURE

On Foster Superheaters

Excellent illustrations comprise the bulk of the material contained in a 48-page publication issued by the *Foster Wheeler Corporation* and known as *Superheater Catalog* 304. Visualization of surrounding conditions in each installation is easily possible as a result.

What text there is presented covers the history of Foster superheaters and their application to many types of boilers, including longitudinal drum, cross drum, bent tube and return tubular. Included in turn are many modifications of design such as vertical and horizontal baffling, waste heat and single pass.

Emphasis is placed particularly on convection, radiant heat, combination, separately fired, waste heat and portable superheaters.

A steam table extending up to 1500 lbs. absolute pressure and 300 deg. superheat terminates the publication.

MILL EQUIPMENT

Automatic Circuit Breaker New General Electric Product

An automatic circuit breaker, designed for use on 125-volt alternating or direct current, with ratings of 6, 10 and 15 amperes, is now being manufactured by the merchandise department of the General Electric Company, at Bridgeport, Conn.

This device was developed to control and protect branch lighting circuits, as well as small motor-driven apparatus, and differs from similar breakers in that it combines the positive action of the electromagnet with the time lag of the thermometallic element, but does not require the thermo element to do any mechanical work. The breaker operates single pole with a double break.

The opening of the silver contact points due to heating of the thermal element on overload causes all of the current to pass through the magnet, and trips the breaker instantly. The time necessary to heat the element under the various degrees of overload constitutes the lag which is comparable to the action of a fuse, permitting the momentary inrush of current but protecting against a continued overload.

As an appliance switch it can be mounted in any position, the manufacturers say, has no exposed metal, functions equally well on alternating or direct current, and will withstand severe vibration without opening.

The sliding contacts tend to maintain clean surfaces. The floating contact spreader assures even, level bearing and equal pressure. The toggle handle movement is easy to operate, and always indicates by its position whether the circuit is open or closed.

The catalog numbers are GE-2669, GE-2668 and GE-2667 for the 6, 10 and 15 amperes, respectively.

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June Cement Imports Shown by Countries

The following statistics, furnished by the Department of Commerce, show imports in June of several types of cement, by countries, and the United States exports of hydraulic cement in that month.

IMPORTS OF ROMAN, PORTLAND AND OTHER HYDRAULIC CEMENT—FREE AND DUTIABLE—BY COUNTRIES OF ORIGIN FOR JUNE, 1928

Imports Cement	1928		1927		Per cent 1928 over or under 1927	
	Barrels	Value	Barrels	Value	Barrels	Value
June	266,537	$359,637	129,111	$201,682	+106%	+78%
6 months	1,336,827	1,831,276	1,004,649	1,510,422	+ 33%	+21%

Countries of Origin	June, 1928		First 6 Months, 1928	
	Barrels	Value	Barrels	Value
Belgium	237,886	$312,471	1,054,479	$1,410,455
Denmark	14,000	18,940	185,155	249,655
France	740	1,509	7,197	18,794
Germany	—	—	1,267	2,937
Norway	—	—	30,000	62,180
Poland and Danzig	—	—	4,166	3,555
Italy	2	4	2	4
Hungary	—	—	10	31
United Kingdom	5,950	8,959	39,200	53,216
Canada	7,959	17,754	13,351	27,980
Japan and Chosen	—	—	2,000	2,469
Grand Total	266,537	$359,637	1,336,827	$1,831,276

IMPORTS OF CEMENT BY U. S. CUSTOMS DISTRICTS

	First 6 Months, 1928		June, 1928	
	Barrels	Value	Barrels	Value
Maine and New Hampshire	25,867	$44,021	7,959	$17,754
Vermont	974	1,378	—	—
St. Lawrence	1,510	2,894	—	—
Massachusetts	342,554	479,891	53,295	72,834
New York	88,921	130,907	11,292	16,050
Philadelphia	61,873	89,328	32,888	47,483
North Carolina	111,447	136,482	59,046	71,738
South Carolina	249,804	344,811	30,000	37,187
Florida	43,207	56,628	—	—
Sabine	4,500	7,762	1,500	2,062
Galveston	50,748	67,392	12,600	17,211
San Antonio	9,000	11,578	—	—
Los Angeles	6,001	8,454	—	—
Oregon	56,118	69,143	13,998	17,312
Washington	44,679	61,120	12,000	17,144
New Orleans	3,622	4,926	3,500	4,790
Maryland	4,166	3,555	—	—
Porto Rico	182,355	246,700	14,000	18,940
Rhode Island	36,286	47,667	14,458	19,128
Ohio	2	12	1	4
Hawaii	13,193	16,627	—	—
Total	1,336,827	$1,831,276	266,537	$359,637

UNITED STATES EXPORTS OF HYDRAULIC CEMENT, JUNE, 1928

Exports Cement	1928		1927		Per cent 1928 over or under 1927	
	Barrels	Value	Barrels	Value	Barrels	Value
June	59,536	$ 201,313	69,205	$ 237,281	—14%	—15%
6 months	385,596	1,335,414	415,626	1,414,909	— 7%	— 9%

Florida Plant Closes Down

A temporary shutdown of the Florida Portland Cement Company plant at Hooker's Point became effective August 1st, as announced by S. W. Storey, vice-president. A subnormal demand for cement is given as the chief reason for the closing. It is anticipated that operation will be resumed in 90 days.

"A large supply of finished cement—probably sufficient to fill orders over a period of three months—is on hand at the Hooker's Point plant," Mr. Storey said.

In addition to closing down the kilns and grinding plant, the quarries at Brooksville, where 25 men are normally employed, were closed down earlier in the week.